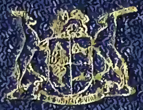

UNION OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE

DIVISION OF BOTANY

BOTANICAL SURVEY MEMOIR No. 32

AN ACCOUNT OF THE PLANT ECOLOGY OF THE TABLE MOUNTAIN AREA OF PIETERMARITZBURG, NATAL

by

D. J. B. KILLICK, M.Sc.

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AN ACCOUNT OF THE PLANT ECOLOGY OF THE TABLE MOUNTAIN AREA OF PIETERMARITZBURG, NATAL

(With map, 14 figures and 24 plates being a thesis submitted
for the degree of Master of Science in the
University of Natal)

◆

By
D. J. B. KILLICK, M.Sc.
Botanical Survey Officer, Pretoria

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FOREWORD.

It will seem unnecessary to local inhabitants but possibly not so to some overseas readers to point out that the Table Mountain of Pietermaritzburg, Natal is far removed from the world famous Table Mountain dominating the Cape Peninsula. The climate and vegetation of the two Table Mountains are very different, the Cape one being in the winter rainfall region and supporting the distinctive " Cape " flora and the Natal one being in a summer rainfall region and supporting a temperate and sub-tropical vegetation.

Different sites on the Natal Table Mountain Area are subject to sharp contrasts in climatic conditions largely owing to big variations in altitude. The intensity of light, temperature, wind, mist and rainfall vary appreciably depending on elevation and aspect. This gives rise to a very varied flora and Mr. Killick distinguishes at least 5 different types of vegetation within the area of his botanical survey.

The vegetation, however, is not all in its climax stage. It is in an area now reserved for native habitation. Herds of goats and cattle are given free range and the natives themselves make inroads into the more durable timber species for building huts and other domestic uses.

It is some years since this thesis was completed. For it, Mr. Killick was awarded the Junior Scott Medal in 1954. Conditions in the field have changed little since then, and this memoir is a valuable contribution to our knowledge of the Union's flora and one which will be especially helpful to students of ecology in Natal. It was prepared under the guidance of Professor A. W. Bayer, a member of the Botanical Survey Advisory Committee.

R. A. DYER,

Chief: Division of Botany and
Director of Botanical Survey of the Union of South Africa.

Pretoria,

21 April, 1958.

INTRODUCTION.

INTRODUCTION.

The study of the plant ecology of the Table Mountain Area was undertaken during 1948 and 1949. For purposes of comparison, several trips were made to Little Noodsberg 15 miles (24km.) north-east of Table Mountain, an area supporting almost similar vegetation.

Apart from casual collectings by D. I. Johnstone, A. P. D. McLean, E. A. C. L. E. Schelpe and C. J. Ward the Table Mountain Area has not been explored floristically since Krauss's time. Krauss visited the area between 1838 and 1840 and collected 85 species, 37 being new to science. (Krauss *et al.* 1844–1846). The check-list at the end of the present memoir comprises 580 species. Numbers following plant names are my collecting numbers.

Analysis of the stages in the plant succession was based on observation and inference. In order to obtain a clear picture of the composition and structure of certain communities, profile diagrams were constructed.

The appended map was prepared from the Trigonometrical Survey Office map of the area (sheet no. 1930DAA). The boundaries of the different types of vegetation were drawn in with the aid of aerial photographs.

I am indebted to Professor A. W. Bayer of the Botany Department, University of Natal, for help in the field and for guidance in the writing of this memoir. To the late Dr. B. S. Fisher and Mrs. K. Gordon-Gray, also of the University of Natal, I am grateful for the identification of a large number of the pteridophytes and angiosperms. I am indebted to Mr. S. Garside of the Bolus Herbarium for the identification of all the lichens and mosses collected in the Table Mountain Area.

In addition, I thank the following:— Dr. C. Heard (formerly Botany Department, University of Natal) for pH determinations; Mr. J. Scogings (formerly Geology Department, University of Natal) for information on the geology of the Table Mountain Area; Mr. D. McKenzie Malcolm for kindly checking the spelling of the Zulu names of the birds: Mr. D. N. Watton for taking most of the photographs and Mr. I. S. Ferreira for allowing me to camp on his farm.

Finally, I thank the Council for Scientific and Industrial Research for providing a grant with the help of which this study was carried out.

CHAPTER I.

TOPOGRAPHY, GEOLOGY AND SOILS.

Chapter I.

TOPOGRAPHY, GEOLOGY AND SOILS.

The area under consideration is situated in the Inanda Native Reserve approximately 13 miles (21 km.) due east of Pietermaritzburg in the Midlands of Natal. Like most native reserves in the country, the Inanda Reserve supports a heavy native population.

The dominant topographical feature of the area is the flat-topped Table Mountain stretching north to south about 2½ miles (4 km.) and west to east about ¾ mile (1 km.) The trigonometrical beacon at the highest point on the mountain is situated in lat. 29° 36′ 02″ S. and long. 30° 35′ 51″ E., 3,151 feet (960 m.) above sea level. The altitude falls from this height to 1,200 feet (366 m.) at the bottom of the river valleys.

The Table Mountain Area is drained by the Umgeni and Umsindusi Rivers, which have incised their courses to produce deep valleys. In addition to the two rivers, there are numerous streams, some of which flow continuously throughout the year, while others dry up during winter.

The geological formation is as follows:—

- D. Recent. The Soils.
- C. Karroo System.
  - 1. The Dwyka Series.
- B. Cape System.
  - 1. The Table Mountain Sandstone Series.
- A. Basement Complex.
  - " Old Granite " and invaded rocks of the Swaziland System.

Rocks of the Basement Complex underlie Table Mountain and the adjacent forest and treeveld-clad slopes. The contact between the " Old Granite " and the Table Mountain Sandstone above may be seen in the cliff at the southern end of the mountain. Outcrops of granite, usually of a hybrid nature, are common in the valleys.

The " Old Granite " yields a coarse, light, yellowish creamy soil containing fragments of quartz and felspar. The metamorphic rocks give a fine red soil. .On the whole, soils derived from rocks of the Basement Complex are shallow, due no doubt to the steepness of the valley slopes.

The Table Mountain Sandstone is very conspicuous in the cliffs which bound the mountain. Exposed in the cliffs are two bands of maroon micaceous shale and two sets of vertical joints.

On top of the mountain near the edge, glaciated pavements may be seen. There are two sets of striations, the one set running N. 50° E. — S. 59° W., and the other N. 36° E. — S. 36° W. (Mountain and Hodson, 1933: 91).

Talus slopes, supporting blocks of Table Mountain Sandstone often arranged in several tiers, are situated at the base of the cliffs. Talus formation is due to rapid weathering of the basement rocks, with consequent undermining of the Table Mountain Sandstone above.

The Table Mountain Sandstone yields a light, sandy soil containing quartz pebbles. Du Toit, quoted by Bews (1920: 371), stresses that soils derived from Table Mountain Sandstone are distinctly poor and sour–a defect intensified by the occasional development of a layer of hard lateritic ironstone just below the surface.

Dwyka Tillite lies unconformably on the Table Mountain Sandstone. Mountain and Hodson (1933: 93) give the geological succession near the spring on top of the mountain some 600 yards south-west of the beacon, as follows:—

" Weathered tillite:	100 feet.
Fine sandy grift:	1 foot.
Coarse grift:	3 feet 6 inches
Unstratified Sandstone:	1 foot.
Various banded rocks:	11 feet.
Sandstone with rare pebbles:	10 feet.
Table Mountain Sandstone."	

CHAPTER II.

CLIMATE.

1. Winds.
2. Rainfall.
3. Temperature.
4. Mist.
5. Hail.
6. Light.
7. Evaporating Power of the Air.

CHAPTER II.

CLIMATE.

1. WIND.

The prevailing surface winds of the interior of Natal are as follows (Anon., 1941). During the mid-summer season (December – February), the prevailing direction is east and south-east. From March to May the frequency of east and south-east winds decreases, while the frequency of west winds increases. Between June and August the intensity of west and north-west winds increases and the south-east winds decrease to less than half their summer frequency. Spring may be described as the season of windy weather; the frequency of calm falls below 20 per cent with south-east winds again becoming important.

The south-east winds, which blow from the high-pressure system over the Indian Ocean into the low-pressure areas, are the chief rainbearing winds. The cyclonically induced north-west winds (bergwinds) are hot and dry. The high temperature of these north-west winds is due to compression as they descend from the escarpment.

The south-east and north-west winds are important ecologically. Slopes facing south and south-east are exposed to the cool rainbearing winds, while the north and north-west slopes are exposed to the desiccating bergwinds. Thus Kloof Forest is present at the upper elevations of slopes facing south and south-east, while less mesophytic forest or scrub occupies slopes facing north and north-west.

Winds striking the cliff are frequently deflected upwards causing strong updraughts. Apart from their physiological effect on cliff-face vegetation, the updraughts play a part in the dispersal of plants. The winged fruits of *Combretum kraussii* and *C. holosericeum*, the plumose seeds of *Oncinotis inandensis* and the fruits of various members of the Compositae, are often found on top of the mountain. Neither *Combretum holosericeum* nor *Oncinotis inandensis* actually grows on the summit.

Windthrown trees are occasionally found in Kloof Forest. They are generally found in parts of the forest where the soil is shallow and very moist, for example near the base of the cliff. (Plate 1.)

2. RAINFALL.

The only rainfall station in the Table Mountain Area is situated at the Umgeni Dam.* The normal annual rainfall for this station and for the ones at Windy Hill, 10 miles (16 km.) north of Table Mountain and Little Noodsberg 15 miles (24 km.) north-east of Table Mountain, are given in Table I. The two latter stations have been included because they occur in areas of almost similar floristic composition to Table Mountain.

---

* Now completed and known as the Nagle Dam.

Table I.
RAINFALL NORMALS.

Station	Lat. S.	Long E.	Altitude		No. of years.	Mean annual rainfall		Mean No. of days.
			ft.	m.		ins.	cm.	
Umgeni Dam........	29° 35′	30° 37′	1,400	427	7	30·42	77·27	82
Windy Hill Wattle Coy	29° 30′	30° 31′	2,100	640	13	40·66	103·2	103
Umhume Wattle Est. (Little Noodsberg)	29° 29′	30° 45′	2.200	671	5	45·08	114·5	111

The effects of topography on rainfall are shown in Table I. The low mean annual rainfall of 30·42 inches (77·27 cm.) for the Umgeni Dam, situated at the bottom of the Umgeni Valley, is probably due to interception by the neighbouring mountains. The relatively high figures for the stations at Windy Hill and Little Noodsberg may be attributed to their positions on or near the top of mountains. From these figures it appears probable that Table Mountain receives a higher rainfall than the Umgeni Dam.

The seasonal distribution of rain is important ecologically. Table II gives the mean seasonal rainfall for the Umgeni Dam station.

Table II.
MEAN SEASONAL RAINFALL AT UMGENI DAM.

	Winter.	Spring.	Summer.	Autumn.	Year.
In. (cm.)....	2·46 (6·25)	8·26 (20·98)	10·69 (27·15)	9·1 (22·89)	30·42 (77·27)
Per cent....	8	27	35	30	100

It will be noticed that summer is the wettest season and winter the driest. The winter is invariably dry. In 1945 a serious drought occurred i.e. for this part of the country; the annual rainfall total was 21·33 inches (54·18 in August and 0·01 inch (0·03 cm.) in September. It is clear that only a xerophytic type of vegetation such as thornveld, which is resistant to drought, can flourish in river valleys.

3. Temperature.

No temperature data are available for the Table Mountain Area.

Temperature range in the Table Mountain Area depends largely upon topography. The widest range exists in the river valleys. During the day time, especially in summer, temperatures are high in the valleys. The southern sides of the valleys receive full insolation, while the northern sides receive heat by reflection. Bergwinds contribute to the production of high temperatures. At night, in winter on the other hand, the river valleys experience low temperatures as a result of cold air drainage, which renders them liable to frost. Frost is not, however, common. The rainfall station at the Umgeni Dam has only twice recorded frost since its establishment in 1941.

At higher elevations temperature range is not so wide. Frost is absent. It would appear that the absence of frost at higher altitudes and its rareness in the valleys are partly responsible for the successful growth of coastbelt species in the Table Mountain Area.

4. MIST.

Two types of mist occur in the Table Mountain Area, namely Plateau Mists and Valley Mists.

(*a*) *Plateau Mists.*

Table Mountain lies in part of the Midlands locally known as the mistbelt. In this region mists, usually associated with a light wind from a south-east direction, form on the plateaux soon after sunset and remain until an hour or two after sunrise. Table III gives the average frequency of mist at three stations in the mistbelt.

TABLE III.

AVERAGE FREQUENCY OF MIST AT THREE NATAL STATIONS (5 yrs.). (Anon. 1941).

Station.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Nottingham Road	9	3	6	5	4	3	4	3	7	11	8	10
Mistley.......	9	5	5	3	2	1	1	2	5	9	7	8
New Hanover.	4	2	2	5	1	1	1·5	1	1	2	0·2	2

(*b*) *Valley Mists.*

Valley mists occur in winter as a result of cold air drainage. When the atmosphere is calm, cold air, because of its greater density, drifts from the plateaux and drains down the adjacent slopes into the valleys below. On winter mornings it is common to observe the Umgeni and Umsindusi River Valleys completely covered with a white mist, which often persists until 09·00 hrs.

The corticolous lichen *Sticta aurata* var. *subglaucescens*, normally a light greyish-green colour, was found to take on a bright green colour after mist. It is interesting to note that the gelatinous lichens *Leptogium bullatum* and *L. tremelloides* do not become turgid after mist, as they do after rain.

5. HAIL.

Hail sometimes accompanies thunderstorms. The hailstorm which broke over the Table Mountain Area on February 6th. 1949, caused considerable damage to vegetation. The bark of many trees in the Amatulu Forest was torn and pitted, while leaves and small twigs were strewn over the forest floor. A large society of *Marattia fraxinea* was laid low.

6. LIGHT.

Light intensities were measured with a Weston phototronic photometer. In order to be able to take readings above 50 foot candles, several filters were used. The percentage of light let through by each of the filters and combinations of them was calculated with the aid of a photo-electric absorptiometer.

Kloof Forest, occurring on slopes facing south, south-east and south-west, receives very little direct sunlight during winter, because of the shading effect of the adjacent 300 feet (91m.) high cliffs. Light reaching the forest in winter was found to have an intensity of one tenth of full sunlight.

The effect of tree canopies is to reduce the intensity of light reaching lower layers and the ground. Several readings were taken under the crowns of trees belonging to different types of vegetation (Table IV).

TABLE IV.

LIGHT INTENSITIES.

Type of vegetation.	Species.	Light intensity as a fraction of full sunlight.
Duverroia adhatodioides Consociation	*Duvernoia adhatodioides*	$\frac{1}{70}$
Kloof Forest	*Xymalos monospora* festooned with *Rhoicissus capensis* & *Cissus hypoleuca*	$\frac{1}{120}$
	Trichilia roka	$\frac{1}{100}$
	Solanum auriculatum in disturbed part of forest.	$\frac{1}{35}$
Streambank Forest	*Chaetacme aristata* bearing *Smilax kraussiana.*	$\frac{1}{100}$
Thornveld	*Acacia karroo*	$\frac{1}{2}$

It is interesting to note that Bews (1912: 284) recorded a light intensity of $\frac{1}{600}$ of full sunlight in "Yellowwood Bush" and $\frac{1}{60}$ — $\frac{1}{100}$ in "Rocky Stream Bush". The figure for "Yellowwood Bush" is much lower than any reading taken in Kloof Forest at Table Mountain.

7. EVAPORATING POWER OF THE AIR.

The importance attached to *evaporating power of the air* (as defined by Livingstone, 1935: 446) in ecological studies has been questioned in recent years. According to Thornthwaite (1940: 22) *evaporating power of the air* is a theoretical index which is unrelated to actual evaporation or transpiration. Thornthwaite explains that transpiration depends upon the density of the plant cover, the character of the plant association, atmospheric conditions and evaporation, and upon internal characteristics of the individual plant. Nevertheless it was considered worth while investigating the *evaporating power of the air* in different parts of the Table Mountain Area, since it does give a single-value expression for a combination of several climatic factors, namely air temperature, water vapour pressure deficit and air movement.

A simple evaporimeter was constructed for use in the field consisting of a Livingstone spherical white atmometer, reservoir, connecting tube and a new type of rainproof valve.

Vitiation of results occurs if rain or mist enters the atmometer. When the outside of the atmometer is wetted the menisci in the pores are destroyed and water is drawn into the atmometer from the outer surface by the force of a water column represented by the height of the top of the atmometer above the level in the reservoir. Numerous types of rainproof valve have been invented. These have been reviewed by Thone (1924: 408-414). Mercury valves of various patterns are the most commonly used, but they are more or less complicated in structure and difficult to install. For greater simplicity an ordinary rubber bunsen valve frequently used in chemical apparatus was incorporated in the set-up (Figure 1) in the hope that it would act as a rainproof valve.

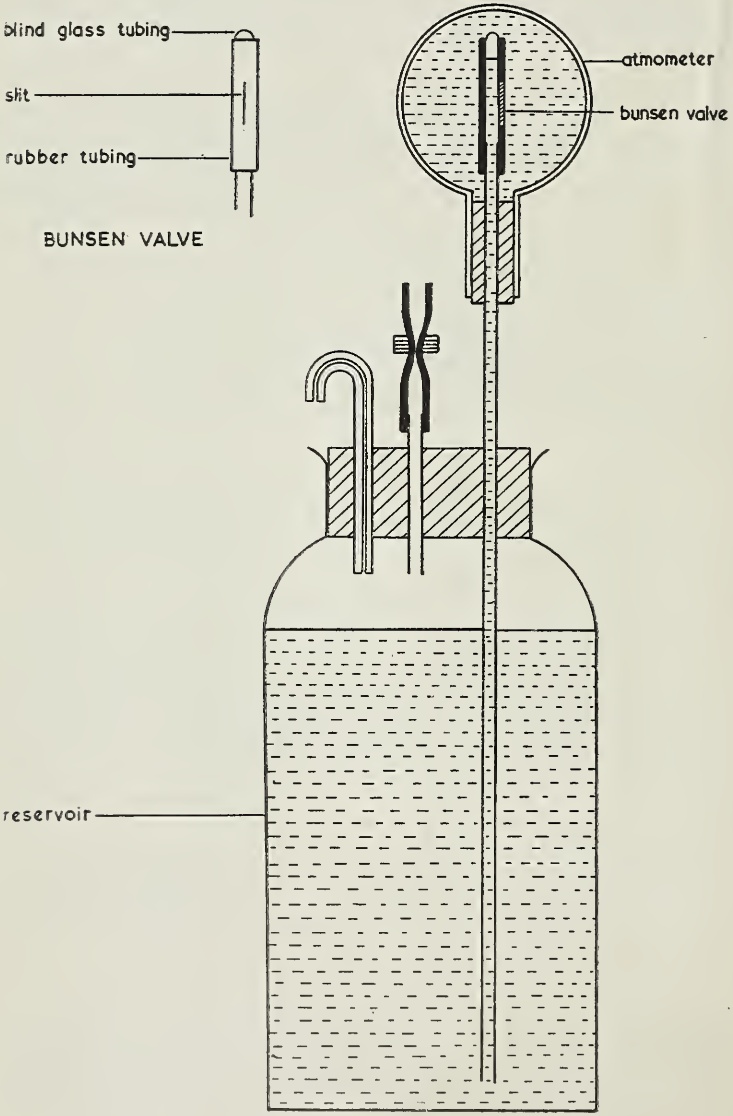

Fig. 1. Set-up of evaporimeter.

The instrument was tested, first of all to find out whether the valve hindered the movement of water from the reservoir to the atmosphere. Two evaporimeters with atmometers of similar coefficient, the one with a bunsen valve and the other without, were subjected to identical atmospheric conditions on a rotating table for two days. The two evaporimeters showed equal evaporation losses, which indicated that the valves did not interfere with the movement of water outwards.

Secondly, the instrument was tested to find out whether the valve prevented water from entering the atmometer. An atmometer was subjected to a very fine spray of distilled water for an hour. The instrument showed no increase in weight i.e. there was no reversal error. From the results of the above tests it was concluded that the bunsen valve permitted only a one-way movement of water.

Five evaporimeters were set up and standardized in the usual way on a rotating table against an atmometer of known coefficient.

The five standardized instruments were placed in parts of the Table Mountain Area supporting types of vegetation dependant upon aspect and elevation, namely:—

1. Grassveld on summit of mountain (Plate 2) 3,100 ft. (945m.)
2. Kloof Forest (Amatulu) S. aspect 2,600 ft. (793m.)
3. Thornveld N.W. aspect 1,800 ft. (549m.)
4. Woodland N.E. aspect 2,600 ft. (793m.)
5. Kloof Forest S. E. aspect 2,600 ft. (793m.)

Clearings were made in the last four habitats.

Evaporating power of the air was determined by measuring the volume of water necessary to fill the reservoir to its original level.

Readings of *evaporating power of the air* were taken at 10-day intervals. Difficulties of transport prevented readings from being taken at shorter intervals. Readings of evaporimeters 1, 2 and 3 were taken on one day and readings of 1, 4 and 5 on the following day. Evaporimeter 1 recorded *evaporating power of the air* over the 10-day period starting from both the first day and from the second. Table V gives the corrected readings and the mean daily evaporation. The march of evaporation rate is shown graphically in Figure 2.

TABLE V.

EVAPORATION IN CC. FROM POROUS CUP EVAPORIMETERS.

	Evap. 1 Grassveld First Day.	Evap. 2 Kloof Forest.	Evap. 3 Thornveld.	Evap. 1 Grassveld Second Day.	Evap. 4 Woodland.	Evap. 5 Kloof Forest
April 27—May 18...........	—	108·6	127·9	—	—	—
May 8 or 9—May 18 or 19...	—	363·8	317·8	—	397·0	163·7
May 18 or 19—May 28 or 29..	—	370·5	323·0	—	462·0	329·4
May 28 or 29—June 7 or 8....	224·7	185·2	263·4	173·6	224·8	119·1
June 7 or 8—June 17 or 18...	289·3	285·2	310·8	278·0	313·7	—
June 17 or 18—June 27 or 28..	344·9	348·1	402·0	356·2	484·9	297·7
June 27 or 28—July 7 or 8....	250·0	160·0	—	255·0	421·1	195·0
TOTAL...........	1108·9	184·4	1744·9	1062·8	2303·5	1104·9
Mean daily evaporation......	27·7	26·0	29·1	26·6	38·4	22·1

It will be noticed that for the first month there are no readings for evaporimeter 1 situated in the grassveld. This was due to interference by natives and cattle. Evaporimeter 3 was destroyed by natives during the last 10-day period.

The results must be treated with caution for the following reasons:—

1. With the exception of Kloof Forest only one instrument was used in each habitat. To obtain an accurate picture of evaporation rate several evaporimeters should have been randomly distributed in each habitat.
2. Readings were taken during one season only i.e. winter.
3. The results are not strictly comparable because the instruments could not be read simultaneously; some time elapsed between visits to each station.

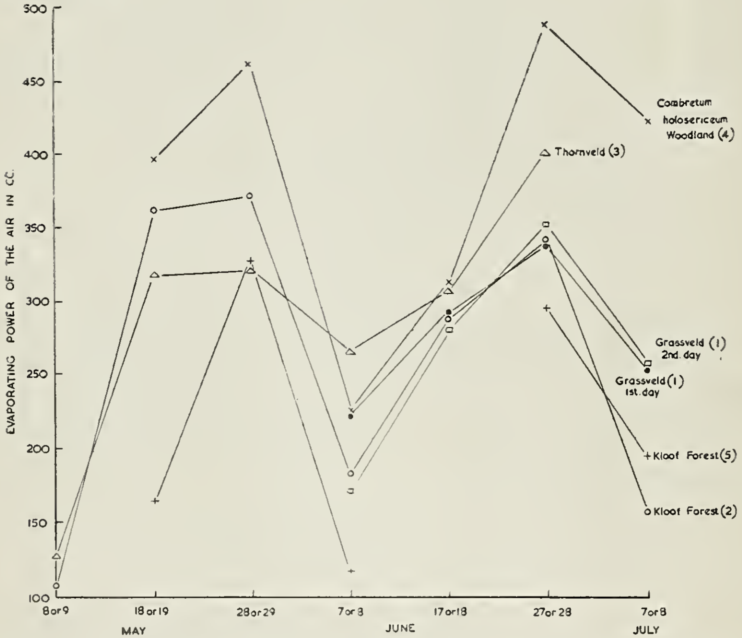

FIG. 2.
March of evaporation rate over 10-day periods in Grassveld, Thornveld, Kloof Forest and *Combretum holosericeum* Woodland.

The results suggest that *evaporating power of the air* in the Thornveld is higher than in Kloof Forest and Grassveld. Thus, a river valley climate, characteristic of thornveld regions is indicated. The majority of readings for evaporimeters 2 and 5 (Kloof Forest) are low as is to be expected. This low evaporation could be the result of a variety of factors but here it is probably due to the shading effect of the adjacent cliff and the protection afforded from bergwinds. The comparatively high readings recorded on May 18th. and 28th. for evaporimeter 2 are difficult to account for. It is possible that local winds were responsible for the increase in *evaporating power of the air* during the two 10-day periods.

The curves for evaporimeters 4 and 5 in Figure 2 demonstrate the influence of aspect on *evaporating power of the air.* The south-east facing slope on which evaporimeter 5 was situated receives much less direct sunlight than the north-east facing slope on which atmometer 4 was situated; for a considerable portion of the day the south-east facing slope lies in the shade cast by the adjacent cliff. The south-east facing slope supports climax Kloof Forest, while *Combretum holosericeum* Woodland, which is seral to Kloof Forest, is present on the north-east facing slope.

The Climate of the Table Mountain Area according to Köppen's Classification.

According to the climatic map of South Africa prepared by Schulze (1947: 32–37) and based on Köppen's classification, the Table Mountain Area is situated on the line separating the two climatic regions Cwb and Cfwa, the former including the major part of the interior of Natal and the latter the coastbelt. The Cwb climate is defined as warm temperate rainy; at least one month has a mean temperature below 64·4° F. (18·0° C) and at least eight months have mean temperatures above 33·8° F (1·0°C.); the coldest month is above 26·6° F (–3·0° C.); the mean temperature of the warmest month is below 71·6° F. (22·0° C.) and there is sufficient rain during all months.

From an ecological point of view, the position of Table Mountain on the line separating the two climatic regions is significant. It helps to explain why coastbelt communities are present in the Table Mountain Area.

CHAPTER III.

THE PRISERES.

A.—THE HYDROSERE.

1. Vlei Hydrosere—
    - (*a*) *Sphagnum truncatum* Consocies.
    - (*b*) *Scirpus* Associes.
    - (*c*) *Juncus-Fuirena* Associes.
    - (*d*) *Cliffortia serpyllifolia* Scrub.
    - (*e*) *Trichopteryx-Ischaemum* Associes.
    - (*f*) *Myrica conifera* Scrub.

2. Stream Hydrosere.
    - (i) Main Stream Channel.
        - (*a*) *Hydrostachys-Sphaerothylax* Associes.
        - (*b*) *Phragmites-Typha-Miscanthidium* Associes.
        - (*c*) Semi-aquatic Communities.
        - (*d*) *Cyperus latifolius* Consocies.
        - (*e*) *Cymbopogon-Hyparrhenia* Associes.
        - (*f*) Streambank Scrub.
        - (*g*) Streambank Forest.
    - (ii) Stream Pools.
        - (*a*) Algal Communities.
        - (*b*) *Jussieua diffusa* Consocies.
        - (*c*) *Pycreus mundtii* Consocies.

B.—THE LITHOSERE.

1. Top of Mountain.
    - (*a*) Lichens.
    - (*b*) Bryophytes.
    - (*c*) *Selaginella dregei.*
    - (*d*) Herb Communities.
    - (*e*) *Passerina-Euryops* Scrub.

2. CLIFF FACE.

- (i) Cool and Moist Aspects.
  - (*a*) Myxophyceae.
  - (*b*) Bryophytes.
  - (*c*) *Selaginella kraussiana.*
  - (*d*) Short Herb Communities.
  - (*e*) Tall Herb Communities.
  - (*f*) *Passerina filiformis* Scrub.
- (ii) Hot and Dry Aspects.
  - (*a*) Lichens.
  - (*b*) Bryophytes.
  - (*c*) *Selaginella dregei.*
  - (*d*) Herb Communities.
  - (*e*) *Pterocelastrus-Schrebera* Scrub.

3. TALUS SLOPES.

- (i) Cool and Moist Aspects.
  - (*a*) *Duvernoia adhatodioides* and *Seemannaralia gerrardii* Consociations.
- (ii) Hot and Dry Aspects.
  - (*a*) *Seemannaralia gerrardii* Consociation.

4. REGIONS WITH SCATTERED BOULDERS.

- (*a*) Initial Cryptogamic Stages.
- (*b*) *Aristida-Sporobolus* Grassveld.
- (*c*) *Cymbopogon marginatus* Consocies.
- (*d*) Mixed Scrub.

CHAPTER III.

THE PRISERES.

This chapter is devoted to a detailed account of the initial and medial stages of the Hydrosere and the Lithosere.

A. THE HYDROSERE.

The Hydrosere can be conveniently divided into the Vlei Hydrosere and the Stream Hydrosere. The relationships of the plant communities in the Hydrosere are shown in Figure 3.

1. VLEI HYDROSERE.

The only vlei of considerable dimensions in the Table Mountain Area is situated on top of the mountain. This vlei, lying in a north-south direction, is about 1 mile (1. 6km.) long by 50 feet (15m.) wide and narrows down to a single main channel from 2–3 feet (0.6–1m) wide just before it drains out as a small waterfall, which spills over the side of the cliff into the Amatulu Forest 300 feet (91m.) below.

A view of portion of the vlei is shown in Plate 3, and a map of the of the same portion is given in Figure 4. The profile in Figure 5 was taken across the width of the vlei at a–a in Figure 4.

The vlei contains a number of open pools in which water is stagnant or flows only slowly. In other places the water is not open, but lies and flows between herb-capped hummocks of varying size. In parts it is possible to cross the vlei by stepping from hummock to hummock without getting wet.

(*a*) *Sphagnum truncatum Consocies.*

The initial or pioneer stage in the succession is represented by the moss *Sphagnum truncatum,* which occurs as a rooted, submerged aquatic in stagnant pools. The moss forms pure, closed communities about 6 inches (15 cm.) high, completely covering the floors of the pools.

(*b*) *Scirpus Associes.*

Scirpus prolifer and *S. fluitans* are dominant in this stage of the succession. They occur in the centre of vlei pools up to 20 feet (6m.) wide and about 5 inches (13 cm.) deep. *Scripus prolifer* and *S. fluitans* are rooted in mud and their shoots project 2–3 inches (5–8 cm.) above the level of the water.

(*c*) *Juncus-Fuirena Associes.*

Towards the edge of deepish pools and in shallow pools 2–3 inches (5–8 cm.) deep, *Juncus lomatophyllus* and *Fuirena chlorocarpa* are dominant in pure consocies. Associates include *Cyperus corymbosus, Juncus* sp. (207), *Panicum aequinerve* and *Laurembergia repens.*

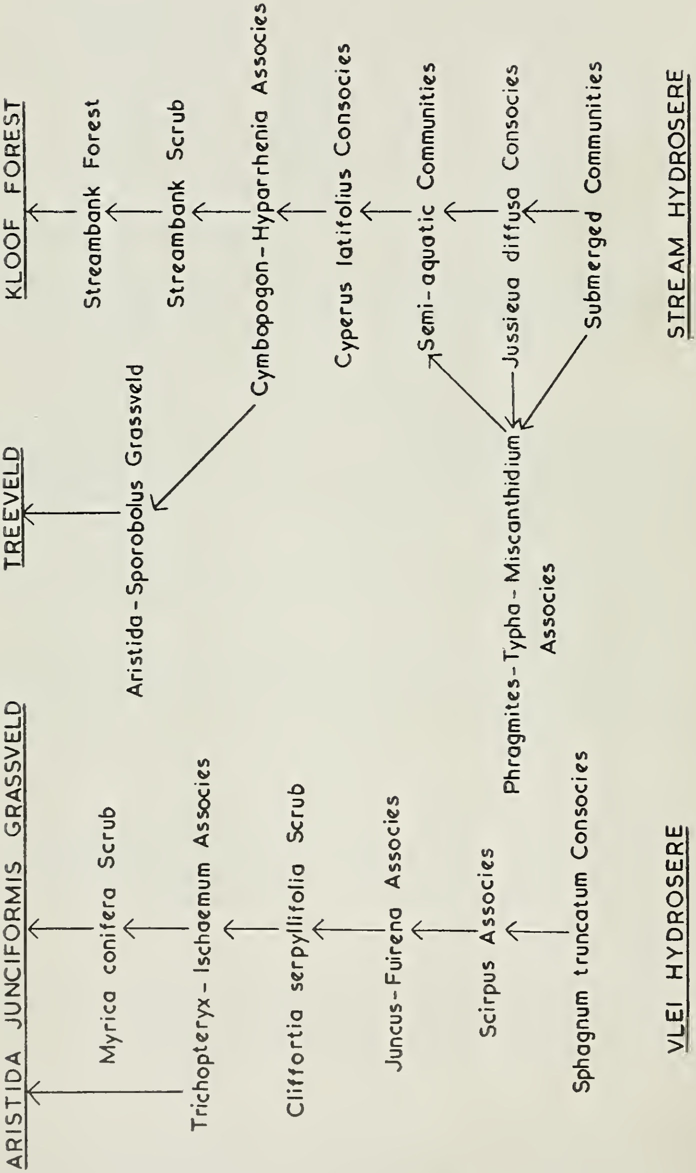
KLOOF FOREST
Streambank Forest
Streambank Scrub
Cymbopogon-Hyparrhenia Associes
Cyperus latifolius Consocies
Semi-aquatic Communities
Jussieua diffusa Consocies
Submerged Communities
STREAM HYDROSERE
TREEVELD
Aristida-Sporobolus Grassveld
Phragmites-Typha-Miscanthidium Associes
ARISTIDA JUNCIFORMIS GRASSVELD
Myrica conifera Scrub
Trichopteryx-Ischaemum Associes
Cliffortia serpyllifolia Scrub
Juncus-Fuirena Associes
Scirpus Associes
Sphagnum truncatum Consocies
VLEI HYDROSERE

Fig. 3.
The relationship of the plant communities in the Vlei and Stream Hydroseres.

(*d*) *Cliffortia serpyllifolia Scrub.*

The woody shrub, *Cliffortia serpyllifolia*, about 2 foot 6 inches (75 cm.) high, soon invades pools occupied by the *Juncus-Fuirena* Associes. It occurs in dense consocies covering a large area of the vlei.

▨	Aristida junciformis Consocies	▥	Trichopteryx – Ischaemum Associes
⋮⋮⋮	Mixed associes on moist soil: Laurembergia repens, Scirpus fluitans, Fuirena chlorocarpa, Juncus lomatophyllus, Scirpus falsus & Panicum aequinerve.	▤	Mixed associes: Pycreus macranthus Lycopodium sarcocaulon, Fuirena chlorocarpa, Dissotis incana, Aganthisanthemum chlorophyllum Trichopteryx dregeana
AAA	Andropogon eucomus	MMM	Myrica conifera
BBB	Berkheya rhapontica	VVV	Panicum aequinerve
CCC	Cliffortia serpyllifolia	XXX	Xyris sp (204)
CyCy	Cyperus corymbosus	⫯⫯⫯	Helichrysum glomeratum
DDD	Dissotis incana	ѱ ѱ	Juncus lomatophyllus
EEE	Eriochrysis pallida	ooo	Scirpus fluitans
FFF	Fuirena chlorocarpa	+ + +	Sphagnum truncatum
HHH	Hypogynium schlechteri	⬭	Hummock about 1 ft (30cm.) high, vertical sides
III	Ischaemum arcuatum	a—a	Position of profile in Figure 5
KKK	Agrostis natalensis	⁘	Water
LLL	Laurembergia repens		

KEY TO FIGURE 4

(*e*) *Trichopteryx-Ischaemum Associes.*

This is a stage of hygrophilous herbs occupying soil which is constantly moist. The hummocks, though elevated from the surrounding pools sometimes by as much as 1 foot 6 inches (45 cm.) are in contact with water basally and water can easily rise this distance by capillary movement.

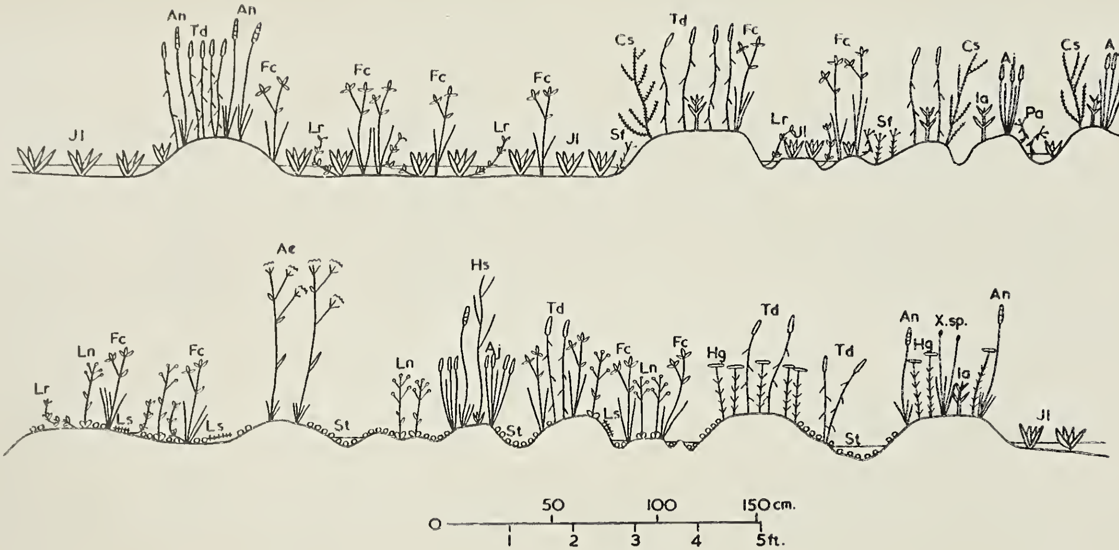

Fig. 5.—Profile section of Vlei.

Ae *Andropogon eucomus*, Aj *Aristida junciformis*, An *Agrostis natalensis*, Cs *Cliffortia serpyllifolia*, Di *Dissotis incana*, Fc *Fuirena chlorocarpa*, Hg *Helichrysum glomeratum*, Hs *Hypogynium schlechteri*, Ia *Ischaemum arcuatum*, Jl *Juncus lomatophyllus*, Ln *Lobelia nuda*, Lr *Laurembergia repens*, Ls *Lycopodium sarcocaulon*, Pa *Panicum aequinerve*, Sf. *Scirpus fluitans*, St *Sphagnum truncatum*, Td *Trichopteryx dregeana* and X.sp. *Xyris sp.* (204).

Trichopteryx dregeana and *Ischaemum arcuatum* mix to form a large associes. Associated herbs are numerous. The ferns are represented by *Lycopodium sarcocaulon, L. cernuum, Gleichenia polypodioides* and *Dryopteris thelypteris.* Grasses include *Aristida junciformis, Agrostis natalensis Eriochrysis pallida, Andropogon eucomus* and *Hypogynium schlechteri.* Among the Cyperaceae there are *Scirpus falsus, Pycreus macranthus, Mariscus* sp. (256), *Schoenoxiphium caricoides, Scleria hirtella* and *Rhynchospora glauca.* Other monocotyledons are *Xyris* sp. (204), *Schizochilus zeyheri, Disa polygonoides* and *Satyrium* sp.(234). Dicotyledonous herbs include *Laurembergia repens, Lobelia nuda, Dissotis incana, Hypericum lalandii, Centella coriacea, Berkheya rhapontica, Helichrysum aureonitens, Aganthisanthemum chlorophyllum, Chironia purpurascens, Helichrysum glomeratum, Utricularia livida* and *Drosera burkeana*, which occurs mainly on the vertical sides of the hummocks.

Further succession may proceed along two courses. The hygrophytes may give way to *Aristida junciformis* or they may yield to *Myrica conifera* Scrub.

(*f*) *Myrica conifera Scrub.*

Myrica conifera invades raised hummocks and aggregates to form extensive consocies. Its associates, *Stoebe vulgaris, Passerina filiformis, Cyathea dregei* and a single specimen of *Syzygium cordatum*, occur where sloping banks provide adequate protection from grass fires. Because of the fire factor, it is doubtful whether the scrub will ever develop into Streambank Forest.

Comparison of Table Mountain vlei with the moss bogs of Europe.

Tansley (1939: 679) in describing the moss bogs of Europe, mentions that several species of *Sphagnum* contribute to the formation of peat and hummocks. The aquatic species are the first to colonize the stagnant pools. They are followed by mesophytic species, until eventually a hummock about 1 foot 6 inches (45 cm) high and composed entirely of *Sphagnum* is formed. The hummock is soon invaded by oxyphilous vascular plants. The basal layers of the hummocks die, but they are unable to decay completely owing to the absence of free oxygen and of the normal action of soil bacteria. Thus, peat is formed.

At Table Mountain the single species of *Sphagnum, S. truncatum*, is an aquatic and does not accumulate to form hummocks. In spite of the mists prevalent in the area, consocies of *Sphagnum truncatum* situated on wet soil die out during winter. The dry winter season together with a relatively dry atmosphere when hot winds are blowing probably prevents the moss from succeeding above water level.

It would appear that the substance of many of the hummocks is derived not only from soil wash, but also from dead *Sphagnum truncatum* and plants of later stages in the Hydrosere.

It is possible that the hummocky structure of the vlei is due to the puddling of the soil by cattle, which cross indiscriminately all parts of the vlei, and that the spread of the vlei into *Aristida junciformis* Grassveld is still actively taking place. *Aristida junciformis* capping the hummocks incorporated in the vlei would later give way to vlei grasses and sedges because of the increase in soil water content.

In the moss bogs of Europe, Sphagna usually occupy water of low pH. pH. determinations of numerous samples of soil and water taken from the vlei at Table Mountain during winter and summer, brought to light the fact that the areas inhabited by *Sphagnum truncatum* do not have a low pH as compared with other regions of the vlei. Indeed, pH values for all parts of the vlei proved remarkably uniform. The lowest pH recorded was 5·8 and the highest 6·2. Values between these limits were also obtained for the adjoining *Aristida junciformis* Grassveld.

2. STREAM HYDROSERE.

Two rivers, the Umgeni and Umsindusi, drain the Table Mountain Area. Both rivers are swift-flowing. During the rainy season they frequently come down in flood leaving the adjacent cultivated fields under water. At all times they are very turbid, carrying huge quantities of silt down to the sea.

Clearly marked zonation into submerged and floating communities is characteristic only of certain shallow pools; in the rivers themselves, submerged and floating aquatics cannot secure a firm footing.

(i) *Main Stream Channel.*

(*a*) *Hydrostachys-Sphaerothylax Associes.*

The partially submerged aquatics, *Hydrostachys natalensis* (Plate 4) and *Sphaerothylax algiformis* are dominant in this stage of the succession.

Hydrostachys natalensis, which is found attached to the ridges of small rapids in the Umgeni River, forms pure consocies.

Sphaerothylax algiformis with a thalloid growth form, occurs in consocies on granite boulders in the Umgeni River against which water washes, and its white remains are scattered abundantly on dry, exposed boulders. The level of the water fluctuates considerably throughout the year, consequently it is possible that the community is a shifting one.

(*b*) *Phragmites-Typha-Miscanthidium Associes.*

The dominants of this stage in the succession are *Phragmites mauritianus*, *Typha latifolia* and *Miscanthidium capensis.*

Phragmites mauritianus occurs in pure consocies or mixes with either *Typha latifolia* or *Miscanthidium capensis* or both. The reed, growing up to 12 feet (3·5m) high, forms a fringe to the rivers or is dominant on small islands. Quite frequently its stolons trail downstream for nearly 40 feet (12 m.) and but for the current the shoots would root in the middle of the river.

The building of a dam wall across the Umgeni River and the diverting of the river has permitted the extension of a *Phragmites-Typha* Associes over the bed of the river below the wall The only water present in this bed comes from several streams draining the surrounding valley. This reedswamp community supports a particularly large bird population.

(*c*) *Semi-aquatic Communities.*

Semi-aquatic communities follow the *Hydrostachys-Sphaerothylax* Associes or the *Phragmites-Typha-Miscanthidium* Associes. The term "semi-aquatic" covers light-demanding plants growing on soil which is always moist.

Several plants are dominant in consocies. *Leersia hexandra* fringes the circumference of many islands. It forms a dense community.

The annual *Polygonum salicifolium* forms extensive consocies on the river banks. During autumn and winter the dead brown remains of this plant are clearly visible miles away. It is one of the first plants to colonize recently formed alluvia.

Scirpus chlorostachys and *S. subprolifer* produce consocies about 9 inches (23 cm.) high.

The associated plants mix indiscriminately with the dominants of the above consocies. The pteridophytes are represented by *Equisetum ramosissimum* and *Dryopteris gongylodes.* The grass *Digitaria adscendens,* with creeping rhizomes, helps to fix moist sand. Prominent Cyperaceae are *Scirpus paludicola, Fimbristylis dichotoma, Cyperus difformis* and *C. corymbosus.* It is interesting to note that the last-named sedge is the only herb which is common to both the rivers and to the vlei on top of the mountain. Common dicotyledons are *Alternanthera sessilis, Rhamphicarpa tubulosa, Epilobium hirsutum, Matricaria nigellaefolia* and *Veronica anagallis.*

(*d*) *Cyperus latifolius Consocies.*

Cyperus latifolius, growing about 2 feet 6 inches (75 cm.) high, is dominant in this stage of the succession. Associated with it is *Cyperus sexangularis.*

The succession now passes to the *Cymbopogon-Hyparrhenia* Associes or Streambank Scrub.

(*e*) *Cymbopogon-Hyparrhenia Associes.*

Dominants of this associes are *Cymbopogon marginatus* and *Hyparrhenia cymbaria* both with erect culms up to 5 feet (1·5m.) in height. Mixing with the dominants are *Echinochloa crus-pavonis, Panicum glabrescens, Bothriochloa glabra, Sorghum sudanense* and *Pennisetum natalense.*

This successional stage is transitional to Streambank Scrub and Grassveld.

(*f*) *Streambank Scrub.*

Among the first plants to appear in this stage are *Jussieua suffruticosa, Sesbania* sp. (495) and *Cliffortia strobilifera.* They are followed by the palm *Phoenix reclinata, Maesa lanceolata, Tricalysia lanceolata, Grewia occidentalis, Baphia racemosa* and *Salix woodii,* none of which is more than locally dominant.

These woody plants make up a type of scrub which is open and short in character.

(*g*) *Streambank Forest.*

Streambank Forest forms a discontinuous fringe to rivers and streams in the Table Mountain Area. Much of the forest has been cut out by natives in order to provide land for cultivation.

This forest is distinct in character and physiognomy. Many of the constituent trees approach in growth form primitive tropical types. Undergrowth is sparse, while lianes are abundant.

The height of the canopy ranges from 15–60 feet (4·5–18 m). depending upon topographical features of the landscape. Streambank Forest with a northern aspect is short and not very luxuriant, while forest with a south or south-east aspect, especially at the head of streams, is tall, and clearly defined strata are present. In parts the canopy is close and well-knit by lianes, and in others it is very open. The development of a good canopy brings about conditions approaching those found inside Kloof Forest. Both light intensity (see Table IV) and saturation deficit are reduced.

Streambank Forest in the Table Mountain Area tends to be mixed in character; rarely is one species dominant over a large area.

At the head of streams situated near the base of the cliff, consocies are developed. Conditions here are very hygrophytic due no doubt to the shading effect of the adjacent cliff. *Macaranga capensis*, a tall tree about 60 feet (18 m.) in height with large obovate leaves, is often dominant in this habitat. It is an important constituent of swamp forest at the coast. *Macaranga capensis* retains its dominance even when Kloof Forest develops on the adjacent spurs. *Sapium ellipticum*, also a euphorbiaceous tree, likewise forms consocies at the head of streams. In the Table Mountain Area it attains a height of 60 feet (18 m.) and a diameter of about 3 feet (1 m.) Sim (1921: 113) gives the height of *Sapium ellipticum* as 30 feet (10 m.) and its diameter as 1 foot (0·3m.) Again, this is a typical coastbelt tree.

The remaining Streambank Forest trees constitute associes in which there is an absence of dominance. They include the following: *Ficus capensis, Syzygium cordatum, Combretum kraussii, Rauvolfia caffra, Chaetacme aristata, Bridelia micrantha, Anastrabe integerrima, Croton sylvaticus, Rapanea melanophloeos, Cussonia spicata* and the palm *Phoenix reclinata*, which often attains a height of 30 feet (10 m.)

Climbers are well represented. The following species, arranged more more or less in order of abundance, were recorded: *Dalbergia obovata, Rhoicissus cuneifolia, Entada spicata, Acacia ataxacantha, Helinus integrifolius, Passiflora* sp. (310), *Glycine javanica, Smilax kraussiana, Rhoicissus digitata, Scutia myrtina, Dalbergia armata, Capparis tomentosa, Ruttya ovata, Popowia caffra, Cnestis natalensis, Mikania cordata* and *Senecio pleistocephalus.*

Of the shrubs, *Justicia campylostemon, Peddiea africana*, and *Pavetta bowkeri* occur in shady parts of the forest, while *Maesa lanceolata, Tricalysia lanceolata, Acalypha glabrata* and *Hibiscus calyphyllus*, all light-demanding plants, are characteristic of the more open parts.

The field layer of Streambank Forest is not particularly luxuriant. A number of herbs occur in pure socies. Socies of the ferns *Marattia fraxinea, Ceropteris calomelanos* and *Blechnum punctulatum* are confined to moist parts of the forest situated at the base of the cliff. The grasses *Oplismenus hirtellus* " forma *simplex* " and " forma *robusta* " and a shade form of *Beckeropsis uniseta* are common. *Clivia miniata* forms socies in dense shade. Dicotyledonous herbs occurring in pure socies include *Plectranthus* spp. and *Peperomia reflexa.*

Species not inclined to aggregate, include ferns such as *Todea barbara, Dryopteris silvatica, Adiantum capillus-veneris, A. raddianum* and *Dryopteris mauritiana* and dicotyledonous herbs such as *Hibiscus pedunculatus* and *Cyathula cylindrica.*

With the arrival of Kloof Forest trees, Streambank Forest is readily transformed into Kloof Forest.

(ii) *Stream Pools.*

(*a*) *Algal Communities.*

The Charad, *Nitella* sp. (588) together with other filamentous Algae, are the pioneers in the centre of these pools, which vary from 1–2 feet (30–60 cm.) in depth.

(*b*) *Jussieua diffusa Consocies.*

Jussieua diffusa is the dominant of the floating aquatic zone (Plate 5). Anchored in the shallower waters bordering these pools, it stretches radially towards the centre.

(*c*) *Pycreus mundtii Consocies.*

Pycreus mundtii, with a stem up to 3 feet (90 cm.) long, encroaches over the area occupied by *Jussieua diffusa*. The succeeding stage namely *Cyperus latifolius* Consocies, has been dealt with on Page 25.

B. THE LITHOSERE.

The major portion of the area under investigation is clothed with vegetation belonging to medial and climax stages of the Lithosere. Rocky areas supporting initial stages of the Lithosere are, however, abundant.

In view of the diverse nature of the rock habitats, it is proposed to deal with lithoseral succession under the following four headings:—

1. Top of Mountain.
2. Cliff Face.
3. Talus Slopes.
4. Regions with Scattered Boulders.

It has been found convenient, in the case of the last three areas, to distinguish between the succession starting on the xerocline and that starting on the mesocline. By xerocline is meant surfaces which have an unfavourable aspect viz. north, north-west and north-east, and are therefore drier and warmer than surfaces of the mesocline with a south, south-east or south-west aspect.

1. Top of Mountain.

Bordering the top edge of the mountain are Table Mountain Sandstone outcrops varying from 3–50 feet (1–15 m.) in width. In addition, there are Dwyka Tillite outcrops more limited in extent. The interrelationships of the communities in the Lithosere on top of the mountain are shown in Fig. 6.

(*a*) *Lichens.*

Atmospheric weathering of Table Mountain Sandstone and Dwyka rocks is slow, consequently lichen communities are able to secure foothold on a comparatively stable substratum.

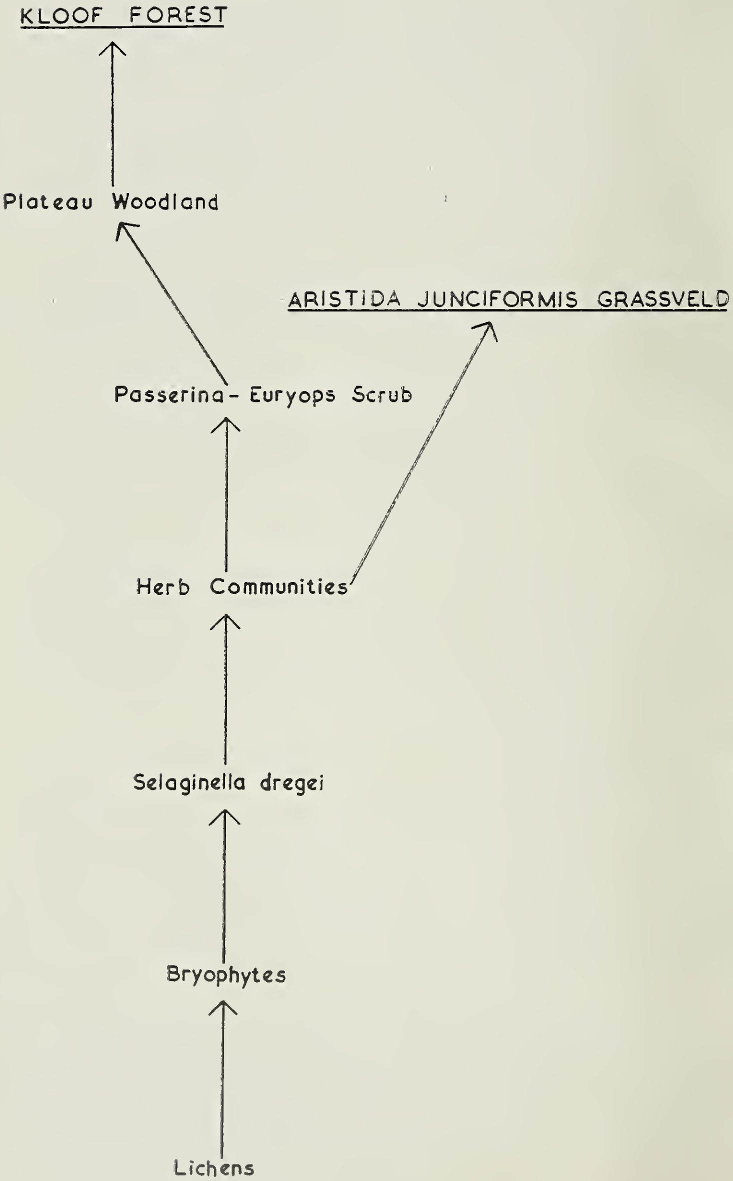

FIG. 6.

Diagram showing the relationships of the plant communities in the Lithosere on top of the mountain.

1. *Crustaceous Lichens.*

Several crustaceous lichens form pure, closed communities on rock surfaces. They include Killick (554) with a thallus 1 mm. thick, *Buellia* sp. (562), *Caloplaca* sp. (557) and *C.* sp (558). *Caloplaca* sp. (557) with a yellow thallus and *C.* sp. (558) with a black thallus are sometimes associated in mixed colonies.

The remaining crustaceous lichens, which do not aggregate to form pure communities, include *Caloplaca* sp. (563), *Lecanora* sp. (555), *Buellia* sp. (543)., *B.* sp. (554), *Solenospora* sp. (561), *Lecanora* sp. (560), *Rhinodina* sp. (556), *Caloplaca* sp. (559) and *Solenospora* sp. (564.) *Lecanora* sp. (560) was found to occur only on the south facing sides of rocks.

Certain of the crustaceous lichens, for example Killick (554), *Lecanora* sp. (555) and *Caloplaca* sp. (559) possess areolate thalli, which often crack and disintegrate leaving new areas for colonization. According to Malinowski (Smith, 1921: 371), the cracking of the thallus is due to the areolae being subjected to alternating periods of wet and dry weather.

2. *Foliose Lichens.*

These leafy types eventually shade out the crustaceous pioneers.

Important in this group are species of *Parmelia*. *Parmelia* sp. (565) is one of the first to come in after the crustaceous lichens; this plant lies very close to the substrate and may attain a diameter of 1 foot (30 cm.) Following it are *Parmelia* sp. (566) and *P.* sp. (568), both with crinkled grey thalli and long black rhizinae.

A considerable nidus of soil is invariably found attached to the lower surface of foliose lichens.

3. *Fruticose Lichens.*

Fruticose lichens, possessing a radiate thallus, occur most frequently on the vertical or nearly vertical faces of Table Mountain Sandstone boulders.

Various species of *Usnea* comprise this group. It is common to find sticking to their fronds, the remains of bird faeces containing numerous seeds.

It is interesting to note that in the Table Mountain Area, lichens seem to play a very much more important part in the biogenous weathering of of rock surfaces than at the coast.

(*b*) *Bryophytes.*

Mosses are the next plants to enter the sere. On aggregation, mats about 1–2 inches (2·5)–5 cm. thick and often 5 feet (1·5 m) across, are formed. These mats serve as suitable beds for the germination of seeds dispersed by wind and birds. Mosses further the disintegration of the subadjacent rock.

Occasionally *Cladonia* sp. (567) invades the moss mats and sends up its podetium parallel to the upright moss gametophytes.

(*c*) *Selaginella dregei.*

Selaginella dregei creeps aggressively over the mats produced by the bryophytes.

(*d*) *Herb Communities.*

Plants comprising this stage in the succession occur in mixed communities in which there is an absence of dominance. The ferns are represented by *Pellaea viridis*, *P. calomelanos* and *Notholaena inaequalis.* The grasses *Rhynchelytrum sp.* (40) and *Microchloa caffra* are common. Sedges include *Bulbostylis densa*, *Pycreus* sp. (32) and *Bulbostylis humilis.* Another monocotyledon is *Cyanotis nodiflora* with blue flowers. Dicotyledonous herbs include *Senecio rhyncholaenus*, *Cissus natalitia*, *Psammatropha myriantha*, *Crassula* sp. (312), *C. heterotricha*, *Anthospermum* sp. (77), *Zornia capensis*, *Ilysanthes* sp. (739), *Wahlenbergia oppositifolia* and *Phyllanthus meyerianus.*

At this point mention must be made of the so-called crevice plants or chasmophytes. Scoring the flat outcrops on top of the mountain are crevices or more technically joints of varying width containing a certain amount of soil. Plants occupying these joints do not necessarily follow each other in orderly succession; shrubs and small trees frequently establish themselves without the prior reaction of lower plants. Common crevice plants are *Passerina filiformis*, *Euryops tenuissimus*, *Aeolanthus parvifolius*, *Anthospermum* sp. (77), *Clutia pulchella*, *Aloe arborescens*, *Ficus ingens*, *Selago natalensis*, *Cyanotis nodiflora* and *Psammotropha myriantha.*

A different succession, involving chomophytes, occurs in shallow rock pockets containing washed or blown sand. One of the first arrivals is the creeping *Digitaria longiflora*, which helps to fix the sand. *Crassula* sp. (312), *Vernonia monocephala* and *Andropogon* sp. (83) enter the sere a little later. They are followed by taller herbs.

The herbs in this stage of the succession give way to either *Aristida junciformis* or *Passerina-Euryops* Scrub.

(*e*) *Passerina-Euryops Scrub.*

Passerina filiformis and *Euryops tenuissimus* form consocies near the top edge of the mountain. (Plate 11.)

Passerina filiformis is a shrub growing up to 8 feet (2·5 m.) high. At one time it must have occupied a much greater area than it does at present; occasional isolated specimens occur in the grassveld some 200 feet (60 m.) from the edge of the mountain. Fire has been its chief enemy.

Euryops tenuissimus, the other dominant with ericoid leaves, does not produce such dense growth as *Passerina filiformis.* It is able to colonize the narrowest of joints in the Table Mountain Sandstone.

Associated with the above dominants are *Philippia evansii*, *Anthospermum* sp. (603), *Psoralea pinnata* and *Stoebe vulgaris*—all sclerophyllous plants.

This scrub is followed by Plateau woodland to be described later.

2. CLIFF FACE.

The cliff face presents a large area for the colonization of pioneer lithophytes. The cliff is over 4 miles (6 km.) long and in places is 300 feet (91 m.) high. It is sheer in parts, and overhanging in others. Numerous pockets, joints and ledges give the face an uneven surface. The relationships of the plant communities on the cliff face is given in Fig. 7.

(i) *Cool and Moist Aspects.*

Parts of the cliff face with a south, south-east and south-west aspect are relatively moist. They face the cool, rainbearing winds and in addition they receive water by seepage through horizontal and vertical joints.

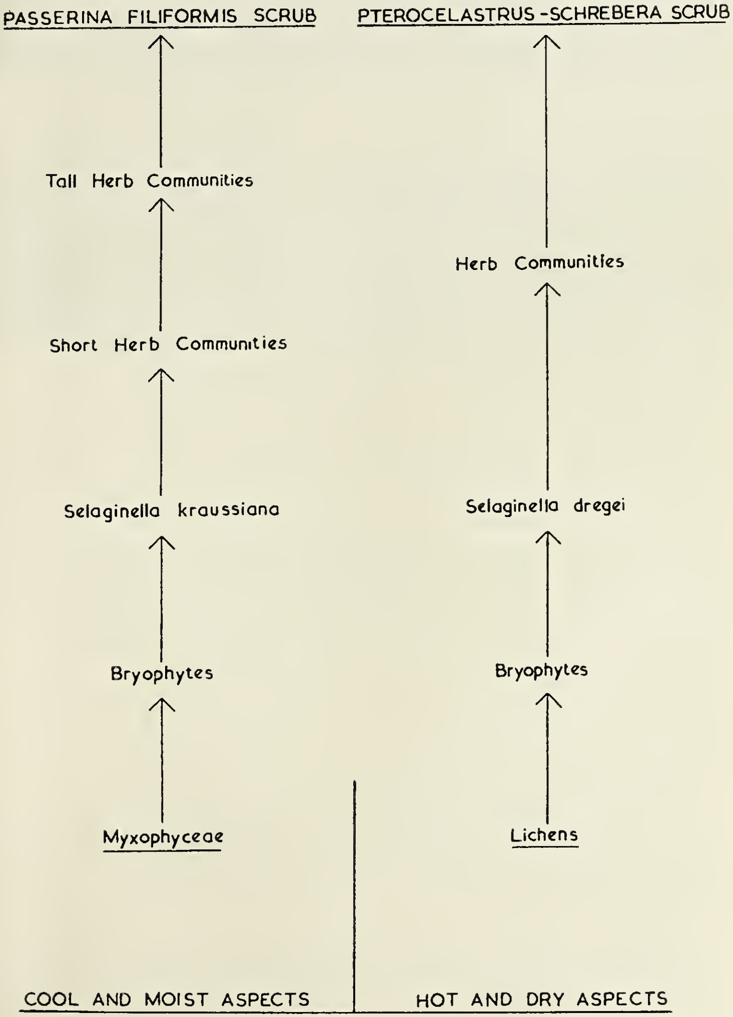

FIG. 7.
The relationship of the plant communities on the cliff face.

(*a*). *Myxophyceae.*

Subaerial members of this class form a slimy coat to moist rocks. That they do have a considerable reaction upon the rock surface is evident when the coats dry up, crack and curl, exposing a thin layer of soil attached to the lower surface of the coat.

The Myxophyceae usually give way to various bryophytes, but occassionally they are followed by *Utricularia livida*, a creeping insectivorous plant with small obovate leaves and incongruously large pink flowers.

(*b*) *Bryophytes.*

Hepatics are usually the first of the bryophytes to appear. They are superseded by members of the Musci.

Sphagnum capense enters the sere at this stage or after *Selaginella kraussiana*. This species of *Sphagnum* is much longer and more delicate in structure than *S. truncatum* found in the vlei on top of the mountain. The moss forms cushions about 8 inches (20 cm). high and often 4 feet (1·2 m.) across. When these cushions turn a brown-white colour, they are a conspicuous feature of the cliff face adjacent to the Amatulu Forest.

(*c*) *Selaginella kraussiana.*

Selaginella kraussiana provides a luxuriant covering to moist surfaces and shades out its predecessors.

(*d*) *Short Herb Communities.*

Several short herbs are dominant in pure consocies on the moist cliff face. They include the ferns *Notholaena buchananii* and *Trichomanes cupressoides*, the monocotyledon *Stenoglottis* sp. (244) and dicotyledonous herbs such as *Utricularia livida*, *Hydrocotyle americana*, *Drosera burkeana*, *Impatiens duthieae*, *Streptocarpus gardenii* and *Begonia natalensis*.

(*e*) *Tall Herb Communities.*

This stage in the succession is dominated by several tall herbs, all of which cover large areas of the cliff face.

Danthonia macowanii (Plate 7), with dark green, pendulous leaves and culms, forms particularly dense consocies. Other herbs forming consocies include *Gleichenia polypodioides*, *Elaphoglossum petiolatum*, *Vittaria isoetifolia*, *Trichopteryx dregeana*, *Ficinia* sp. (598), *Vellozia talbotii*, *Erica aspalathifolia*, *Watsonia densiflora* and *Pelargonium grossularioides*.

Associates are numerous. Ferns present are *Oleandra distenta* with long trailing rhizomes, *Blechnum attenuatum*, *B. punctulatum*, *Adiantum capillus-veneris*, *Pellaea dura* and very rarely *Pityrogramma argentea*. The grasses *Setaria sphacelata* and *Cymbopogon marginatus* are occasional. Prominent Cyperaceae are *Carex spicato-paniculata*, *Scirpus falsus* and *Pycreus polystachyus*. Other monocotyledons are *Aneilema dregeanum*, *Gladiolus cruentus* and *Agapanthus umbellatus*. Dicotyledonous herbs include *Erica cubica*, *E. caffra*, *Anthospermum lanceolatum* and *Monopis stellaroides var. stellaroides*.

Plants belonging to this and the preceding stages in the succession are not entirely confined to the vertical face of the cliff. Certain boulders lying below the cliffs and receiving a continuous spray from waterfalls support a luxuriant covering of mesophilous herbs. *Impatiens duthieae* growing on such boulders presents an attractive sight during summer when it is in flower.

It must be borne in mind that many of the cliff plants may grow in the numerous joints in the cliff face.

(*f*) *Passerina filiformis Scrub.*

Passerina filiformis is the dominant scrub on the moist cliff face. Associated with it are *Philippia evansii*, *Anthospermum* sp. (603), *Stoebe vulgaris*, *Psoralea pinnata*, *Ficus ingens*, *F. natalensis*, and *F. craterostoma.*

The figs frequently germinate in joints or on narrow cliff ledges and then send their roots superficially down the cliff face towards pockets of soil or the forest floor below. The conspicuous brown-red roots of young *Ficus* spp. with stems only 3 feet (1m.) high, may frequently be traced to a distance of 100 feet (30 m.) or more below the main plant.

This scrub represents the climax of the succession on the moist cliff face.

(ii). *Hot and Dry Aspects.*

Parts of the cliff face with a north, north-west and north-east aspect are exposed to severe insolation and the hot bergwinds. Moreover, they face away from the rainbearing winds, consequently it is not surprising to find a xerophytic type of vegetation existing on such rock surfaces.

(*a*) *Lichens.*

Lichens are the first cryptogams to colonize the dry cliff face; lack of moisture prevents various members of the Myxophyceae from assuming the pioneer role.

Crustaceous lichens, especially species of *Caloplaca* form a mosaic of colours on the free face.

Following them are foliose and fruticose types.

Prominent among the latter are *Rocella montagnei*, *Usnea* spp. and *Rocella*, sp. (546).

(*b*) *Bryophytes.*

This successional stage is dominated by various members of the Musci; hepatics are absent.

(*c*) *Selaginella dregei.*

As on the Table Mountain Sandstone outcrops on top of the mountain, *Selaginella dregei* follows after the bryophytes. This plant is able to withstand desiccation during the winter months, when it takes on a white-brown colour. In early spring, after the first rains, it regains its green colour.

(*d*) *Herb Communities.*

None of the herbs occurring in this stage of the succession is more than locally dominant. The smaller species tend to aggregate in small families.

Ferns present are *Pellaea viridis*, *P. calomelanos*, *Mohria caffrorum*, *Oleandra distenta* and *Cheilanthes multifida.* The grasses *Aristida junciformis* and *Rhynchelytrum* sp. (40) are abundant. Other monocotyledons are *Bulbine* sp. (675), *Scilla natalensis* and *Aloe arborescens.* Dicotyledonous herbs include *Anthospermum lanceolatum*, *Crassula rosularis*, *Aptenia cordifolia*, *Erepsis* sp. (434), *Crassula heterotricha*, *Cotyledon* sp. (602), *Pollichia campestris*, *Kalanchoe* sp. (447) and *Helichrysum woodii.* It will be noticed that the majority of the dicotyledons are succulent.

(*e*) *Pterocelastrus-Schrebera Scrub.*

Pterocelastrus echinatus and *Schrebera alata* are co-dominant in this scrub, which represents the climax stage of the succession on the dry cliff face. Both these plants are about 7 feet high and possess hard leaves. (Plate 9.)

Accompanying the dominants, frequently along joints in the face, are *Osyris compressa*, *Euryops tenuissimus*, *Ficus ingens*, *F. sonderi*, *Greyia sutherlandii*, *Ficus natalensis*, *F. craterostoma*, *Canthium mundtianum*, *Ximenia americana*, *Lycium acutifolium* and *Euphorbia tirucalli.*

The part played by aspect in determining the floristic composition of cliff scrub is strikingly apparent from along the top edge of the mountain. On the face of a cliff with a north-east aspect *Pterocelastrus-Schrebera* Scrub may be observed, and a few yards further on where the cliff takes a right-angled turn, *Passerina filiformis* Scrub facing south-east may be seen.

3. TALUS SLOPES.

Talus slopes in the Table Mountain Area support boulders or blocks up to 20 feet (6 m.) across. The boulders are stationary and are often arranged in several tiers.

(i) *Cool and moist Aspects.*

(*a*) *Duvernoia adhatodioides* and *Seemannaralia gerrardii* Consociations.

Talus slopes with a cool and moist aspect are surrounded by Kloof Forest. Such slopes receive very little or no direct sunlight for a considerable part of the year.

The two trees which are dominant on these slopes, *Duvernoia adhatodioides* and *Seemannaralia gerrardi*, commence life as lithophytes, but very soon their roots grow down between the boulders and reach soil.

Duvernoia adhatodiodes forms pure and extensive consociations on talus slopes. Belonging to the Acanthaceae, this plant is a soft-wooded, much branched evergreen shrub or tree about 15 feet (4·5 m.) high. The individual branches may have a diameter of 9 inches (23 cm.). The leaves are large and the crown casts dense shade (See Table IV).

Sim (1921: 37) records *D. adhatodioides* for the coast of Pondoland and Natal and describes it as being rare everywhere.

A profile at right angles to the cliff face through part of the Amatulu Forest, where talus has accumulated and *D. adhatodioides* is dominant, is shown in Fig. 8.

The following points are illustrated in this profile:—

(*a*) The growth form of *Duvernoia adhatodioides* described on Page 34.

(*b*) The abundance of woody forest lianes, for example *Rhoicissus capensis*, *Cissus hypoleuca* and *Acridocarpus natalitius*.

(*c*) The presence of other tree species, for example *Allophylus melanocarpus*, *Ficus capensis* and *Rawsonia lucida*, where boulders are not abundant

The deciduous *Seemannaralia gerrardii* does not form such large consociations as *Duvernoia adhatodioides*. *Seemannaralia gerrardii* is a tree about 30 feet (10 m.) high, but at Table Mountain most specimens are about 15 feet (4·5 m.) high and consist largely of coppice shoots. In spite of its soft wood, this tree has been extensively cut out by the natives.

A feature of mesic talus slopes dominated by either *Duvernoia adhatodioides* or *Seemannaralia gerrardii* is the abundance of herbaceous stragglers such as *Vernonia angulifolia* and *Cyathula cylindrica*, which conceal the boulders during the summer months, making progess through these regions very slow.

Other subordinate plants include the ferns *Dryopteris athamantica* and *Asplenium splendens*, the monocotyledons *Haemanthus natalensis*, *Clivia miniata*, *C.* sp. (466), *Dracaena hookeriana* and *Asparagus* sp. (624.) and the dicotyledonous shrub *Iboza riparia*. Epiphytes present are *Peperomia reflexa*, *Stenoglottis fimbriata*, *Polypodium schraderi* and *Asplenium rutaefolium*.

Both the *Duvernoia adhatodioides* and *Seemannaralia gerrardii* Consociations represent edaphic climax communities.

(ii) *Hot and Dry Aspects.*

(*a*) *Seemannaralia gerrardii Consociation.*

Talus slopes with hot and dry aspects, are surrounded by short *Combretum holosericeum* Forest, which is seral to Kloof Forest.

Seemannaralia gerrardii is the dominant tree on such slopes. Subordinate plants include shrubs such as *Iboza riparia* and *Urera tenax*, herbs such as *Dracaena hookeriana*, *Haemanthus natalensis*, *Cyathula cylindrica* and *Vernonia angulifolia*, and climbers such as *Asparagus* sp. (624), *Senecio brachypodus*, *Clematis brachiata* and *Passiflora* sp. (310). The straggling herbaceous vegetation is not so luxuriant as on the mesic talus slopes.

The profile in Fig. 9 runs through vegetation situated on a dry talus slope with a north-west aspect.

The following points are illustrated:—

(*a*) The growth form of *Seemannaralia gerrardii* described above.

(*b*) The absence of woody lianes.

(*c*) The presence of other tree species, for example *Sapium ellipticum* and *Trema guineensis*, where boulders are not abundant.

As on the mesic slopes, the *Seemannaralia gerrardii* Consociation is an edaphic climax community.

4. Regions with Scattered Boulders.

Under this heading is included the area (excluding talus slopes) between the base of the cliff and the Umgeni and Umsindusi rivers.

Initial stages of the lithosere on slopes with moist or dry aspects eventually give way to *Aristida-Sporobolus* Grassveld. Thereafter, the course of the succession is determined by altitude (see Fig. 10.)

At lower elevations climax Thornveld, *Faurea saligna* veld and *Sclerocarya caffra* veld, are soon established, whereas at higher elevations several seral stages intervene before climax Kloof Forest is reached.

(*a*) *Initial Cryptogamic Stages.*

In this region the rocks consist mainly of hybrid granite. Atmospheric weathering of this rock type is rapid, consequently lichen communities are not so luxuriant as they are on the Table Mountain Sandstone outcrops at higher elevations. Lichens eventually give way to bryophytes.

(*b*) *Aristida-Sporobolus Grassveld.*

The two xerophytic grasses, *Aristida junciformis* and *Sporobolus capensis* supersede the bryophytes and are the first plants to colonize the soil between the boulders. They are dominant on the ridges of spurs where succession is slow, or else they form an understorey to treeveld communities.

(*c*) *Cymbopogon marginatus Consocies.*

This consocies, dominated by *Cymbopogon marginatus* is transitional between *Aristida-Sporobolus* Grassveld and Mixed Scrub at higher elevations. Associates include *Hyparrhenia cymbaria*, *Setaria chevalieri* and *Beckeropsis uniseta*. The consocies is best developed between cultivated fields, where burning is not carried out every year.

(*d*) *Mixed Scrub.*

The composition of scrub at upper elevations on the mesocline and xerocline is practically the same. Woody shrubs and autumnal aspect plants make up this scrub.

None of the constituent plants is more than locally dominant. The following plants arranged in order of abundance were recorded. *Maesa lanceolata*, *Clutia pulchella*, *Pteridium aquilinum* [often growing up to 8 feet (2·5 m.) in height], *Tricalysia lanceolata*, *Athanasia acerosa*, *Leonotis leonurus*, *Calpurnia subdecandra*, *Vernonia shirensis*, *Vangueria infausta*, *Vernonia corymbosa*, *Pseudarthia hookeri*, *Cassia mimosoides*, *Buddleia pulchella*, *Cryptolepis oblongifolia*, *Acokanthera venenata*, *Wahlenbergia grandiflora* and *Euphorbia epicyparissias*. *Caesalpinia decapetala*, an introduced shrub, frequently transforms the scrub into an impenetrable thicket.

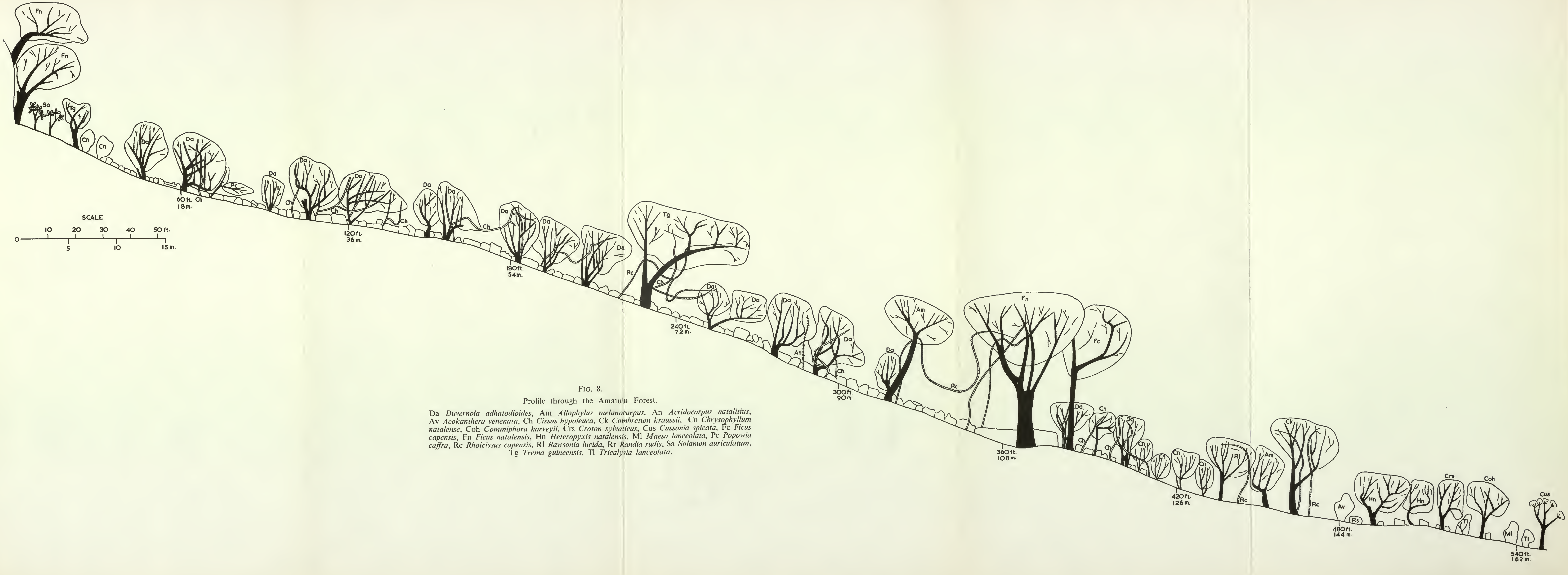

Fig. 8.

Profile through the Amatulu Forest.

Da *Duvernoia adhatodioides*, Am *Allophylus melanocarpus*, An *Acridocarpus natalitius*, Av *Acokanthera venenata*, Ch *Cissus hypoleuca*, Ck *Combretum kraussii*, Cn *Chrysophyllum natalense*, Coh *Commiphora harveyii*, Crs *Croton sylvaticus*, Cus *Cussonia spicata*, Fc *Ficus capensis*, Fn *Ficus natalensis*, Hn *Heteropyxis natalensis*, Ml *Maesa lanceolata*, Pc *Popowia caffra*, Rc *Rhoicissus capensis*, Rl *Rawsonia lucida*, Rr *Randia rudis*, Sa *Solanum auriculatum*, Tg *Trema guineensis*, Tl *Tricalysia lanceolata*.

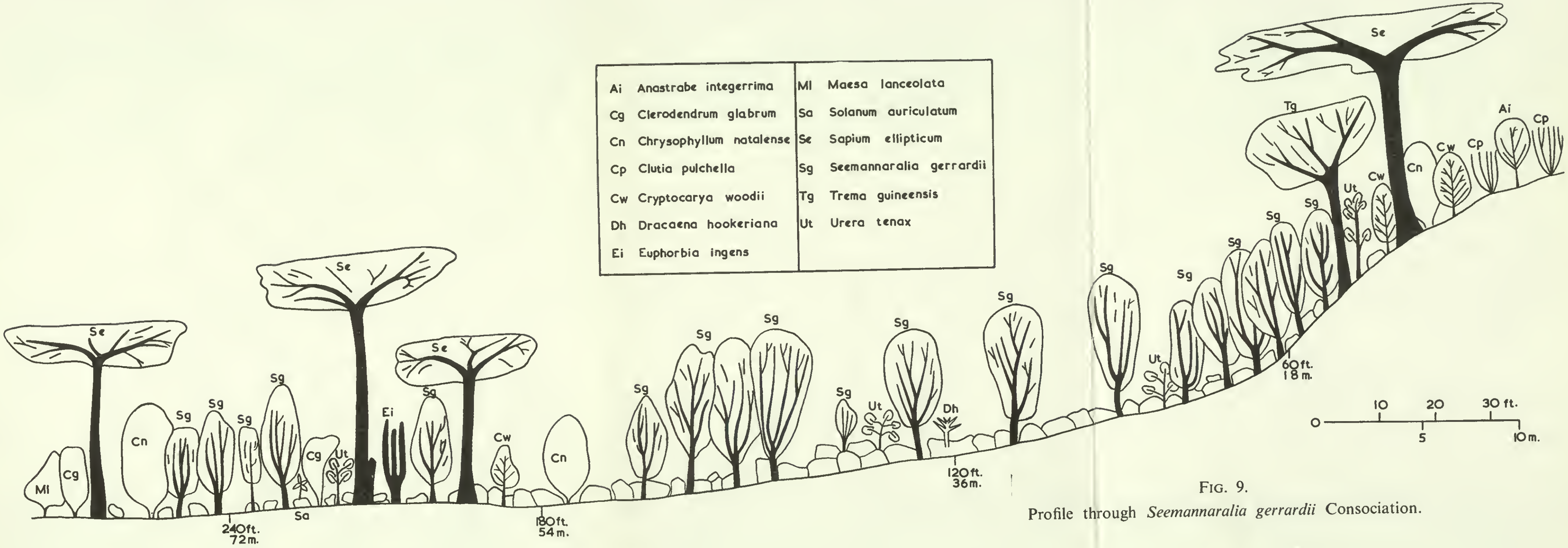

FIG. 9.
Profile through *Seemannaralia gerrardii* Consociation.

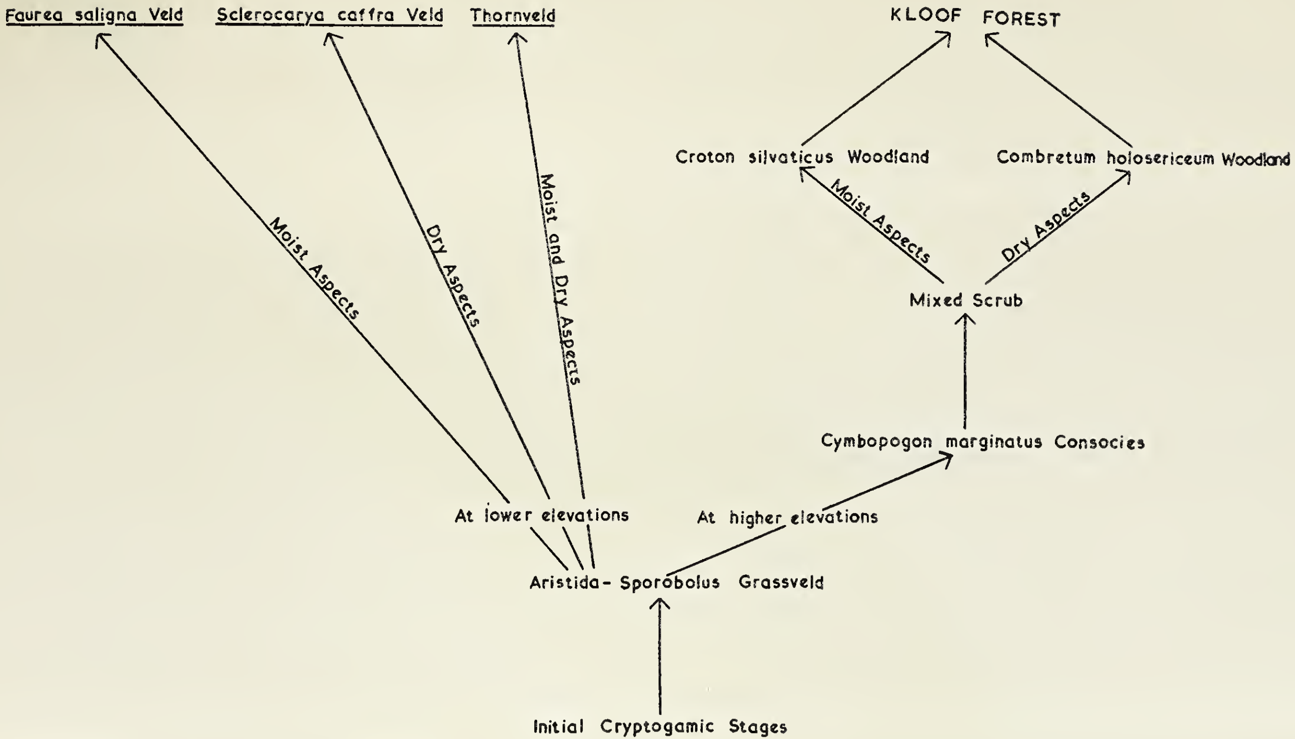

FIG. 10.

Diagram showing the interrelationships of the plant communities in the Lithosere in the region between the base of the cliffs and the rivers.

CHAPTER IV.

ARISTIDA JUNCIFORMIS GRASSVELD.

1. Structure and Composition.
2. The Effects of Overgrazing and Fire.

CHAPTER IV.

ARISTIDA JUNCIFORMIS GRASSVELD.

1. STRUCTURE AND COMPOSITION.

This grassveld situated on top of the mountain is the only stable grassveld in the Table Mountain Area. It covers an area of about 600 acres. (Plate 10.)

The xerophytic bunch grass, *Aristida junciformis* is dominant; the grass cover is very open and the individual tufts of *Aristida junciformis* are raised as much as 4 inches (10 cm.) from the ground (Plate 11.)

Associated with the dominant are the following grasses: *Sporobolus capensis*, *Monocymbium ceresiiforme*, *Eragrostis racemosa*, *Loudetia simplex*, *Trachypogon spicatus*, *Eragrostis capensis*, *Harpechloa falx*, *Rendlia altera*, *Sporobolus centrifugus*, *Alloteropsis semialata*, *Paspalum commersonii*, *Themeda triandra*, *Rhynchelytrum setifolium* and *Festuca scabra*.

Cyperaceae include *Cyperus compactus*, *Kyllinga elatior*, *Bulbostylis collina*, *B. humilis*, *Fimbristylis monostachya* and *Ficinia stolonifera*.

A result of spring burning of the grassveld is an increase in numbers of plants commonly referred to as vernal aspect forbs. These forbs, mainly chamaephytes, hemicryptophytes and cryptophytes, complete their main activities between the time of burning of the grassveld, and the time when the grasses recover sufficiently from the fire to shade them out. Where annual burning is not carried out, for example in parts of Mr. Ferreira's farm and in small areas between cultivated fields, vernal aspect forbs are absent.

Allsopp (unpublished thesis, 1945 : 33–35) traced a definite succession in the appearance of forbs in certain ungrazed grassveld areas in the Pietermaritzburg district. Immediately after burning, low-growing forbs were prominent. As the grasses grew taller in late spring and summer a succession of taller forbs made their appearance. In heavily grazed areas, it was found that the sequence was less pronounced; short forbs flowered continuously from August to May.

On Table Mountain the grass cover is open and is kept low by cattle, thus it is not surprising to find an admixture of tall and short forbs present in late spring and summer. For example, short forbs such as *Exochaenium grande*, *Hypoxis gerrardii*, *Ipomoea simplex*, *Zornia capensis* and *Chaetacanthus setiger* flower in January with tall forbs such as *Aristea woodii*, *Asclepias affinis*, *Dierama* sp. (712) and *Silene burchellii*.

The following forbs arranged in order of abundance occur in vernal aspect socies: *Tulbaghia acutiloba*, *Gerbera natalensis*, *Gazania* sp. (631), *Lasiosiphon kraussianus*, *Scilla* sp. (184), *Anthericum* sp. (180), *Anoiganthus luteus*, *Apodolirion* sp. (676), *Aristea woodii*, *Indigofera velutina*, *Ursinia foeniculacea*, *Hypoxis gerrardii*, *Zornia capensis*, *Ipomoea simplex*, *Chaetacanthus setiger*, *Eulophia leontoglossa*, *Dianthus crenatus*, *Silene burchellii*, *Eulophia hians*, *Helichrysum adenocarpum*, *Becium obovatum*, *Aeschynomene micrantha*, *Polygala ohlendorfiana*, *Eriospermum* sp. (724), *Alysicarpus rugosus*, *Helichrysum caespititium*, *Diclis reptans*, *Polygala gracilenta*, *Crotalaria lanceolata*, *Schizoglossum woodii*, *Euryops laxus*, *Cyanotis nodiflora*, *Tephrosia diffusa*, *Cycnium adonense*, *Oxygonum dregeanum*, *var. dregeana*, *Alepidea longifolia*, *Sebaea sedoides*, *Helichrysum appendiculatum*, *Eriosema kraussiana*, *Polygala serpentaria*, *Argyrolobium rupestre* and *Brachystelma franksiae*.

Autumnal aspect plants are few—a fact attributable to the annual firing of the veld. Unlike vernal aspect plants, autumnal ones tend to die out with frequent burning (Bews, 1920 : 409–411.) *Pteridium aquilinum* forms large socies on top of the mountain.The young green shoots which spring up after fire contrast strikingly with the black tufts of grass. Other autumnal aspects species include *Leonotis leonurus* and *Ocimum suave*.

There is a number of perennial herbs, suffrutices and dwarf shrubs, which are difficult to assign to either of the two aspect socies.

Aganthisanthemum chlorophyllum forms dense consocies in the grassveld, usually in moist areas. *Helichrysum aureonitens* does the same, and silver patches of this community are a conspicuous feature of the landscape. Occasionally *Aganthisanthemum chlorophyllum* and *Helichrysum aureonitens* associate to form mixed socies. That they do prefer moist soil is borne out by the fact that they are abundant as vlei plants.

Selago natalensis, a suffrutex about 2 feet 6 inches (75 cm.) high, is frequent in the veld.

Eugenia albanensis, a dwarf shrub about 6 inches (15 cm.) high, is also frequent between the tufts of *Aristida junciformis*.

Socies of *Blechnum tabulare* occur on the south-facing slopes of small gullies on top of the mountain. The redevelopment of this fern after fire is extraordinary, considering that the rhizomes are situated for the most part above ground. Renewal of frond growth takes place in early spring.

2. The Effects of Overgrazing and Fire.

Less than thirty years ago, the mesophytic bunch grass *Themeda triandra* was the climax dominant of the grassveld on top of the mountain. This information was given to Professor A. W. Bayer of Natal University by the late Professor J. W. Bews, who described the sward of *T. triandra* as " looking like a field of waving corn ". To-day only a few isolated specimens remain. Two factors, namely overgrazing and fire, have to be coinsdered in connection with the " throwing back " of the sere to the *Aristida junciformis* stage.

(*a*) *Overgrazing.*

According to figures supplied to the Division of Botany by the Division of Crops and Pastures, Pretoria, the carrying capacity of grassveld in the Table Mountain Area is 1 animal to 4 acres. On the summit of Table Mountain about 200 head of cattle graze the 600 acres of grassveld—a proportion of 1 animal to 3 acres. In other words, the grassveld is overstocked.

The result of overstocking is that the palatable *Themeda triandra* is eaten, while the relatively unpalatable *Aristida junciformis* is left untouched and eventually assumes dominance.

A relic of the former dominant may be seen on top of Little Noodsberg. A pure stand of *Themeda triandra* occupies a steep slope on one side of a long, deep cleft in the mountain, while the rest of the plateau supports *Aristida junciformis*. Cattle have kept away from the slope on account of its steepness, with the result that *Themeda triandra* has been left untouched.

(*b*) *Fire.*

As with overstocking, the effect of summer burning is to " throw back " the succession to the *Aristida junciformis* stage. For the last three years the grassveld has been burnt during winter. It is possible, however, that summer burning has been carried out in years previous to these.

CHAPTER V.

SINKHOLE SUCCESSION.

1. Sinkhole Formation and Development.

2. Micro-environmental Factors.
    - (i) *Climate.*
        - (*a*) Light.
        - (*b*) Saturation Deficit.
        - (*c*) Wind.
    - (ii) *Fire.*

3. Succession.
    - (i) *Incipient Sinkholes.*
        - (*a*) Mesophytic Herbs and Dwarf Shrubs.
    - (ii) *Intermediate Sinkholes.*
        - 1. *Type* 4.
            - (*a*) *Cyathea dregei.*
            - (*b*) *Maesa lanceolata.*
        - 2. *Type* 5.
            - (*c*) Sinkhole Forest.
    - (iii) *Mature Sinkholes.*

Chapter V.

SINKHOLE SUCCESSION.

Dotted in parallel lines on top of the plateau is a considerable number of sinkholes containing plants. Before the succession taking place in these sinkholes is discussed, it is desirable to examine the possible causes of their formation and the course of their development. Their development is especially important in view of the fact that it determines the rise and fall of the stages in the succession.

1. Sinkhole Formation and Development.

Two alternative causes for their formation immediately present themselves, firstly underground erosion—a mechanical process, and secondly, solution along the joints in the underlying rock—a chemical process.

(i) *Underground Erosion.*

The only published case of this phenomenon in South Africa known to the writer is that described by Henkel, Bayer and Coutts (1938).

The sinkholes at Rosetta described by these writers are situated in lines corresponding with cracks in the soil produced through contraction as the subsoil dries out. The cracks are anastomosing. After heavy storms the cracks carry a large quantity of water, which through corrosive activity forms an underground channel. The roof becomes thin in parts and eventually collapses to form a sinkhole. At the end of each channel a mound of water-transported soil is deposited.

The above-mentioned method of sinkhole formation does not seem applicable to the ones at Table Mountain, for the following reasons:—

(*a*) Vertical cracks in the surface soil are nowhere evident on the mountain.

(*b*) No mounds of deposited soil are present.

(*c*) The sinkholes on Table Mountain tend to run in straight lines, usually west to east.

(ii) *Solution.*

This alternative involves the solution by water of various rock materials along the joints in the subadjacent rock. Such solution would widen the existing cracks with subsequent falling in of the soil.

Evidence for this method of sinkhole formation is strong. Figure 11, showing diagrammatically the development of sinkholes, is based partly on observation and partly on inference.

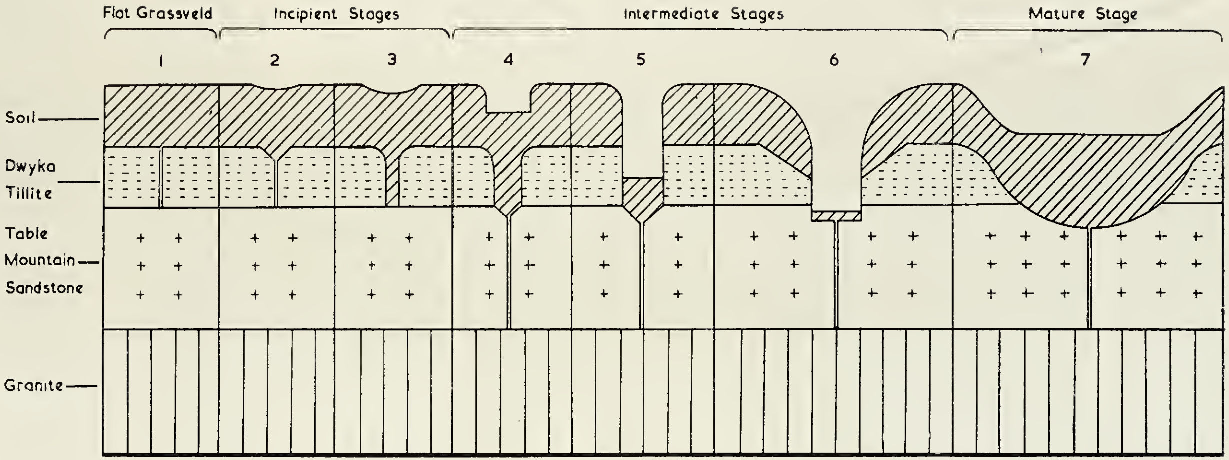

FIG. 11.

Diagrammatic representation of the development of a sinkhole from the incipient to the mature stage.

The line of sinkholes is apparently determined in the first instance by the joints in the Dwyka Tillite. These joints run roughly west to east, as do the sinkholes. In Figure 11 (stages 5 & 6) the Dwyka rock is exposed, but is in a very weathered condition. King (1942: 81) refers briefly to the sinkholes on Table Mountain and suggests that only the Dwyka Tillite is involved in their formation.

Two sinkholes on top of the mountain prove that the Table Mountain Sandstone is also involved. The lower border of the walls of these sinkholes is composed of Table Mountain Sandstone and a vertical joint running in the same line as the holes may be seen (Figure 11, stage 6).

After stages 5 and 6 (Figure 11) the walls of the sinkholes crumble and fall in, while soil washes from the surrounding grassveld. These factors are responsible for the shallowing and widening of the holes.

For the sake of convenience, sinkholes will be referred to as incipient, intermediate and mature. An incipient sinkhole consists of a shallow saucer-shaped depression. Intermediate ones are roughly cylindrical in shape and have bare sides, while mature sinkholes are shallow and wide in structure. Subdivisions of these stages will be referred to as incipient type 2, etc., as distinguished in Figure 11.

2. MICRO-ENVIRONMENTAL FACTORS.

(i) *Climate.*

(*a*) *Light.*

Table VI gives the light values recorded in different sinkhole types on a day in June, 1949.

TABLE VI.

SINKHOLE LIGHT INTENSITIES.

Number of sinkhole	Stage of development	Other details	Light intensity as a fraction of full Sunlight
3	Incipient.....	....	1
4	Intermediate.	South side of floor..................	1
		North side of floor..................	$\frac{1}{8}$
5	Intermediate.	At bottom of hole with no vegetation above	$\frac{1}{500}$
7	Mature......	Under *Xymalos monospora*...........	$\frac{1}{20}$
		Under *Cussonia spicata*..............	$\frac{1}{10}$

In incipient sinkholes light conditions are not very different from those existing in the adjoining grassveld.

In the intermediate type 4, the contrast becomes marked. The north side of the floor is in complete shade during the winter months.

When intermediate type 5 is reached, light intensity values drop to as low as 1/500 of full sunlight.

In mature sinkholes light intensity is mainly dependent upon the density of the crowns of trees contained therein. In Table VI, it will be seen that the light value under *Xymalos monospora*, a tree with a very dense crown, is half that of *Cussonia spicata*, a tree with a spreading, open crown.

(*b*) *Saturation Deficit.*

This factor also depends upon the stage of development of the sinkhole. On the 5th July, 1949, hourly readings of saturation deficit were taken with whirling hygrometer from 10·30 hours to 15·30 hours in the different sinkhole types. Table VII gives the values recorded. Several minutes elapsed between the successive readings taken every hour, so that from a comparative point of view the values are to a certain extent imperface

TABLE VII.

COMPARISON OF HOURLY SATURATION DEFICIT IN GRASSVELD AND IN DIFFERENT SINKHOLE TYPES.

Time.	Station & corresponding S.D. in millibars.					
	Grass-veld.	Intermed. 4.		Intermed. 5 at bottom.	Mature	
		N. side.	S. side.		Under Xymalos monospora	Under Cussonia spicata.
10·30 hrs.............	9·4	7·9	8·7	0	8·5	12·1
11·30 hrs.............	9·5	12·0	12·1	0	6·0	7·3
12·30 hrs.............	11·6	11·9	13·2	0	9·9	9·9
13·30 hrs.............	17·0	13·1	17·2	0	14·3	14·7
14·30 hrs.............	15·0	12·8	15·1	0	11·2	13·9
15·30 hrs.............	13·5	12·2	12·1	1·05	12·8	12·8

It will be noticed that from 11·30 hours to 14·30 hours readings taken in the south part of intermediate type 4, are higher than corresponding readings for the grassveld. A cool south-west wind, which was felt in the grassveld, but not in the incipient sinkhole, was blowing at the time. Other points to note are:—

1. The difference in saturation deficit between the north and south part of the floor, brought about by the shading effect of the north wall.
2. The extremely low readings for intermediate sinkhole 5.
3. The lower saturation deficits under *Xymalos monospora* with a dense crown, compared with the readings recorded under *Cussonia spicata* with a spreading, open crown.

(*c*) *Wind.*

Hot north-west winds sweeping over the top of the mountain only affect directly sinkhole plants that have grown above the level of the surrounding grassveld. The early seedling and sapling stages of plants are protected from the desiccating winds. It is possible that the north-west winds are partly responsible for the stunted nature of the forest trees situated in sinkholes.

(ii) *Fire.*

Sinkholes afford protection to vegetation against annual fires. During 1948 and 1949 the writer was able to examine the effects of fire on sinkhole plants. Invariably the vegetation of incipient sinkholes remained untouched, while that of intermediate and mature sinkholes suffered only to a very small degree around the circumference of the holes.

3. SUCCESSION.

Sinkhole succession starts neither on very dry soil nor in an excess of water, consequently it is mesoseral. The stages in the succession are illustrated in Figure 12.

(i) *Incipient Sinkholes.*

(*a*) *Mesophytic Herbs and Dwarf Shrubs.*

In the incipient sinkhole the first change in the vegetation is exhibited by the grasses. In contrast to the surrounding *Aristida junciformis* Grassveld, the floor is composed of *Chloris pycnothrix* and *Sporobolus capensis* (Plate 12). Both these grasses are pioneers of subseres, consequently it is possible that incipient sinkholes are denuded of *Aristida junciformis* at some stage.

Soon ferns such as *Ophioglossum reticulatum* and *Blechnum tabulare*, the monocotyledon *Zantedeschia albomaculata* and dicotyledonous herbs such as *Nemesia chamaedrifolia*, *Centella coriacea*, *Galopina aspera* and *Pentanisia prunellioides* enter the sere.

They are followed by short shrubs, for example *Nesaea salicifolia*, *Iboza riparia*, *Maesa alnifolia*, *Teucrium riparium* and *Rhus dentata.*

(ii) *Intermediate Sinkholes.*

1. *Type* 4.

Sinkholes of the intermediate type 4 are about 2–3 feet (60–90 cm.) deep and have bare walls. Plants appearing in these holes usually occupy the north side of the floor, for the reasons discussed under environmental factors.

Succession is initiated on the bare walls of the holes. Lichens and bryophytes are the first plants to appear. Prominent among the former are the terricolous *Cladonia* sp. (539) and *Baeomyces* sp. (553) with pink apothecia. The crumbling tendency of the walls makes it an unstable habitat. Herbs later invade the moss mats.

The following stages involving tall plants occur on the floor of sinkholes of intermediate type 4:—

(*a*) *Cyathea dregei.*

The tree fern, *Cyathea dregei*, is the first tall plant to appear. This is possibly due to the fact that spore production in this fern is great and that the spores are very easily dispersed.

(*b*) *Maesa lanceolata.*

Cyathea dregei gives way to *Maesa lanceolata*, a shrub or small tree about 8 feet (2·5m.) in height (Plate 13).

Climbers, herbaceous and woody, help to improve the canopy. They include *Rhoicissus cuneifolia*, *Stephania abyssinica*, *Phytolacca dodecandra* and *Coccinia* sp. (213).

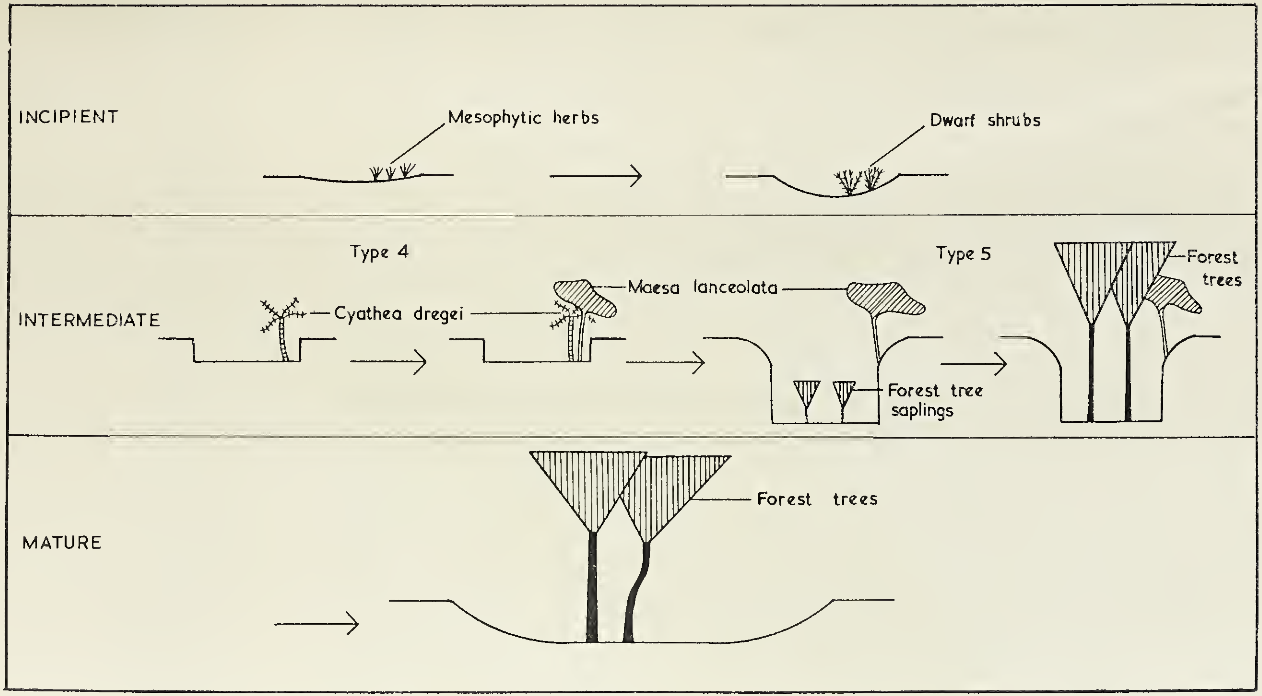

Fig. 12.
Diagram showing stages in sinkhole succession.

2. *Type* 5.

(*c*) *Sinkhole Forest.*

When the sinkhole has developed to intermediate type 5 with a depth of about 15 feet (4·5m.) and *Maesa lanceolata*, etc. overhang the hole, conditions are rendered mesophytic and forest trees and shrubs, which are shade-loving in their early stages of growth, are able to establish themselves in the hole. With the advent of forest trees and shrubs, the climax stage of sinkhole succession is reached.

Bird dispersal plays a major part in the arrival of these forest species. Birds flying from the adjacent lowlands are attracted by the shrubs in the sinkholes. Chief among the birds is the Red-winged Starling, a voracious fruit-eater.

Dominance of one species in sinkholes is only exhibited by *Halleria lucida*, *Solanum auriculatum* and *Syzygium cordatum*; the rest of the forest species comprise mixed communities. The latter include *Rauvolfia caffra*, *Anastrabe integerrima*, *Trichilia roka*, *Protorhus longifolia*, *Combretum kraussii*, *Xymalos monospora*, *Bridelia micrantha*, *Clerodendrum glabrum*, *Cussonia spicata*, *Burchellia bubalina*, *Commiphora caryaefolia*, *Chrysophyllum natalense* and *Canthium ventosum*.

Climbers are represented by *Dalbergia obovata*, *Acacia ataxacantha*, *Rhoicissus cuneifola* and *Smilax kraussiana*.

Members of the forest field layer also make their appearance, often on the sides of the sinkholes. Among the ferns are *Adiantum capillus-veneris*, *Blechnum punctulatum*, *Dryopteris mauritiana*, *Gleichenia polypodioides* and *Pteris quadriaurita*. The grasses *Panicum natalense*, *Setaria chevalieri* and *Rhynchelytrum* sp. (40) are common. *Cyperus albostriatus* was the only sedge found in sinkholes. Other monocotyledonous herbs are *Haemanthus natalensis* and *Drimia* sp. (199). Dicotyledonous herbs include *Lobelia pteropoda*, *Begonia natalensis*, *Streptocarpus gardenii* and *Celosia trigyna*.

Epiphytic lichens are abundant, especially on the south facing sides of trees. The following lichens were collected from *Cussonia spicata*:— *Leptogium bullatum*, *Sticta aurata* var. *subglaucescens*, *Lobaria* sp. (189), *Usnea* spp. and *Buellia* spp.

(iii) *Mature Sinkholes.*

Trees are dominant in mature sinkholes and the floor is almost completely denuded of herbaceous plants (Plate 14). The denudation is brought about by cattle and goats which, because of the shallowness of mature sinkholes, are able to enter and use the holes as a shelter from the hot sun and hot winds.

CHAPTER VI.

TREEVELD.

1. Thornveld.
2. *Faurea saligna* Veld.
3. *Sclerocarya caffra* Veld.

Chapter VI.

TREEVELD.

1. Thornveld.

This climax community arises from the invasion of grassveld by xerophytic and succulent trees, which are able to endure full sunlight right from early stages of growth. Such trees include *Acacia* spp,. *Euphorbia* spp., *Cussonia spicata*, *Combretum holosericeum*, *Dicrostachys glomerata* and *Dombeya rotundifolia.*

Only a brief recapitulation of the atmospheric and edaphic conditions obtaining in Thornveld is necessary at this stage, since they have already been discussed in Chapters I and II.

Mean annual rainfall is low, and drought conditions usually prevail during winter.

Evaporation rate as recorded by the evaporimeter situated in the Umsindusi River Valley is high, as much as 402 cc. of water being evaporated during a 10-day period in June, 1949 (see Table V and Figure 2).

Bergwinds heat up the valleys to a very high temperature during spring, while cold air drainage makes the valleys liable to frost at night in winter.

The soils, of granitic origin, are shallow and possess poor physical qualities.

The dominant trees are *Acacia nilotica* (Plate 15), *Euphorbia tirucalli* and *E. ingens.* The height of the canopy ranges from 10–15 feet (3 m. to 4·5 m.) The spacement of the trees is variable; in some parts of the Thornveld the trees form a closed community as a result of thicket formation, and in others they are separated by as much as 20 feet (6 m.)

Associated with the dominants are *Acacia karroo*, *A. caffra*, *Cussonia spicata*, *Sclerocarya caffra*, *Combretum holosericeum*, *Erythrina caffra*, *Heteropyxis natalensis*, *Dicrostachys glomerata*, *Commiphora harveyii*, *Spirostachys africana*, *Erythrina latissima*, *Dombeya rotundifolia*, *Acacia woodii*, *Heeria paniculosa*, *Aloe candelabrum* and *Rhus lucida.*

Climbers include *Clematis brachiata*, *Helinus integrifolius*, *Acacia ataxacantha*, *Dalbergia obovata*, *Rhoicissus cuneifolia*, *Senecio macroglossus* and *Dalbergia armata.*

A large number of shrubs grow in clumps under the trees. They include *Ehretia rigida*, *Euclea multiflora*, *Smodingium argutum*, *Randia rudis*, *Ziziphus mucronata*, *Buddleia salicifolia*, *Gymnosporia buxifolia*, *Tricalysia lanceolata*, *Iboza riparia*, and *Ochna atropurpurea.*

The grass cover is sparse and consists of *Aristida junciformis*, *Sporobolus capensis* and *Aristida barbicollis*. In parts of the Umgeni Valley there is no grass cover at all and only the shrub *Randia rudis* forms a low understorey to the dominants. Soil erosion is prevalent in such areas. Other herbs are *Barleria obtusa, Peristrophe natalensis* and the ruderal *Ageratum conyzoides.*

Parasites are represented by *Loranthus dregei* and *Viscum* sp. (497). The latter is invariably found growing on *Cussonia spicata.* During a day's work in the Umgeni Valley the writer counted seventeen trees parasitized by *Viscum* sp. (497), and of this number, fifteen were *Cussonia spicata* and two *Acacia nilotica.*

Epiphytes, apart from lichens, are rare. *Mystacidium capense* is sometimes found on Thornveld trees. Of the lichens, *Anaptychia leucomelanos, Ramalina yemensis*, *Teloschistes validus* and *Buellia* spp. are abundant.

The major portion of the Thornveld in the Table Mountain area is secondary; only a few isolated trees remain as relics of the primary climax. The natives have cut out the hard-wooded trees such as *Acacia* spp.and *Combretum holosericeum* for fuel, and have left the comparatively non-usable *Euphorbia tirucalli*, *E. ingens* and *Cussonia spicata.*

Acacia spp. and *Euphorbia tirucalli* form characteristic thickets. Thicket formation apparently takes place because the veld is so overgrazed by cattle and goats that annual fires are unable to burn with great enough intensity to adversely affect the young seedlings (Bayer, 1938: 426). Once the young trees have reached a certain stage, they are extremely resistant to grass fires.

It is possible that the present abundance of *Euphorbia tirucalli* is due to its spread by the native. Because the plant roots easily from truncheon cuttings, it is cultivated as a living fence. The natives also plant clumps of *Euphorbia tirucalli* over the graves of deceased relatives; these graves are widely skirted, for superstition has it that anyone walking through such clumps will get his feet cut by the sleeping spirits below. From groups of trees established in these ways, natural spread can take place.

2. Faurea saligna veld.

Faurea saligna forms a pure type of treeveld on slopes with a south or south-east aspect. Elsewhere in Natal it is also associated with sandstone formations and cool aspects.

Faurea saligna attains a height of 12 feet (3·5 m.) and possesses thick bark—a feature which serves to insulate it from grass fires.

The spacement of the trees is variable, but on the whole they are not situated nearer than 60 feet (18 m.) apart. The presence of numerous stumps indicates that the community was formerly much closer, as is the case at Baynesdrift near Pietermaritzburg, where the crowns of the trees often touch each other.

Randia rudis occurs in clumps under the dominant trees.

The ground cover is provided by the grasses *Aristida junciformis* and *Sporobolus capensis.*

3. SCLEROCARYA CAFFRA VELD.

Sclerocarya caffra is dominant on a rock-strewn slope with a northern aspect near the Umgeni River. This species forms a consociation with a canopy height of about 15 feet (4·5 m.). The individual trees are situated about 20 feet (6 m.) apart.

Randia rudis and the monocotyledon *Aloe candelabrum* form an understorey to *Sclerocarya caffra*.

The grass cover, which consists of *Aristida junciformis*, *A. barbicollis* and *Sporobolus capensis*, is very sparse.

CHAPTER VII.

WOODLAND.

1. *Combretum holosericeum* Woodland.
2. *Croton sylvaticus* Woodland.
3. Plateau Woodland.

Chapter VII.

WOODLAND.

Scrub leads to woodland, which is dominant in areas with a dry aspect where succession is slow. In areas with a moist aspect on the other hand, woodland is limited in extent and occupies a position marginal to Kloof Forest. Three types of woodland may be distinguished:—

1. *Combretum holosericeum* Woodland — dry aspects.
2. *Croton sylvaticus* Woodland—moist aspects.
3. Plateau Woodland—moist aspects.

1. Combretum holosericeum Woodland.

This type of woodland, very open in character, is commonly present at higher elevations of slopes with a north-east or north-west aspect (Plate 16). Evaporation rate on these slopes is high (see Table V and Figure 2). The dominant tree is the deciduous *Combretum holosericeum* with an average height of 20 feet (6 m.) and a girth of 2 feet (0·6 m.). The tree does occasionally attain a height of 40 feet (12 m.), and one specimen measured 8 feet (2·5 m.) in circumference. *Combretum holosericeum* is well known as a constituent of Thornveld.

Associated trees include *Sclerocarya caffra. Erythrina caffra*, *Cussonia spicata*, *Schotia brachypetala*, *Heteropyxis natalensis. Ziziphus mucronata*, *Calpurnia subdecandra* and *Ehretia rigida.*

Randia rudis provides an extensive understorey to the above trees, but *Iboza riparia* and *Solanum auriculatum* are also frequent.

Climbers are numerous and include *Clematis brachiata. Passiflora* sp. (310), *Capparis tomentosa*, *Oncinotis inandensis*, *Cadaba natalensis* *Senecio macroglossus*, *Rhoicissus cuneifolia*, *Scutia myrtina*, *Acacia ataxacantha* and *Dalbergia armata.* The stems of *Acacia ataxacantha* sometimes attain a diameter of 9 inches (23 cm.).

The ground cover is provided by *Aristida junciformis*. *Sporobolus capensis* and numerous ruderals, the most abundant being *Ageratum conyzoides.*

Combretum holosericeum Woodland is invaded by Kloof Forest trees. Foremost among the invaders is *Trichilia roka.* Seedlings of this species grow up in the shade of *Combretum holosericeum* and eventually the adult plants are able to compete with and shade out *Combretum holosericeum.*

A profile at right angles to the cliff face through *Combretum holosericeum* Woodland is given in Figure 13.

The structure of this type of woodland and the stages in the succession described above are clearly seen. An interesting point which is illustrated in the profile (at about 160 feet), is that *Trichilia roka* finds the shade cast by *Randia rudis* suitable for growth. No signs of a dead or cut trunk of a tree were visible at this particular spot and in other places where *Trichilia roka* grows up through *Randia rudis* growing in the open.

Other Kloof Forest trees which come in are *Ekebergia meyeri*, *Fagara capensis*, *Harpephyllum caffrum*, *Combretum kraussii*, *Pygeum africanum*, *Halleria lucida* and *Allophylus dregeanus*.

2. CROTON SYLVATICUS WOODLAND.

This community is situated at the base of the cliff between 2,000 and 2,700 feet (610 and 823 m.). The dominant tree is *Croton sylvaticus*. Associates include *Commiphora harveyii*, *Turraea floribunda*, *Combretum holosericeum*, *Cussonia spicata*, *Rhus macowanii*, *Heteropyxis natalensis*, *Dombeya natalensis*, *Strychnos spinosa* and *Ziziphus mucronata*. The above trees attain a height of about 25 feet (7·5 m.) and form an almost closed community.

Figure 8, a profile through part of the Amatulu Forest, shows some of the constituent trees of this type of woodland.

Climbers are represented by *Rhoicissus cuneifolia*, *Acacia ataxacantha*, *Ipomoea ficifolia*, *Smilax kraussiana*, *Senecio macroglossus*, *Canthium guenzii* and *Dalbergia obovata*. *Ipomoea ficifolia* with showy purple flowers presents an attractive sight when it flowers in March.

Shrubs include *Tricalysia lanceolata*, *Randia rudis* and *Acokanthera venenata*.

The ground cover is provided by the grasses *Aristida junciformis* and *Sporobolus capensis* and other herbs such as *Rhinacanthus communis*, *Haemanthus mackenii* and *Crassula* sp. (615).

3. PLATEAU WOODLAND.

This woodland, following *Passerina-Euryops* Scrub in the lithosere, occupies parts of the plateau which dip in a south, south-east or south-west direction. There is an absence of dominance. The average canopy height is 15 feet (4·5 m.) and the community is almost closed. The following trees are present:— *Alberta magna*, *Gerrardina foliosa*, *Rapanea melanophloeos*, *Eugenia natalitia*, *Ochna arborea*, *Cunonia capensis*, *Myrica conifera* and *Maesa lanceolata*.

Climbers include *Smilax kraussiana*, *Senecio macroglossus*, *Canthium guenzii*, *Rhoicissus cuneifolia* and the diffuse-growing grass *Potamophila prehensilis*.

A distinct field layer exists in Plateau Woodland. *Blechnum punctulatum*, *Sticherus umbraculiferus*, *Trichopteryx dregeana* and *Lobelia pteropoda* produce pure and extensive socies. The remaining herbs are less frequent and do not aggregate in pure socies. They include *Pteris quadriaurita*, *Pellaea viridis*, *Oplismenus hirtellus*, *Ehrharta erecta* var. *natalensis*, *Setaria chevalieri*, *Begonia natalensis*, *Celosia trigyna*, *Hypoestes verticillaris* and the parasite *Harveya speciosa*.

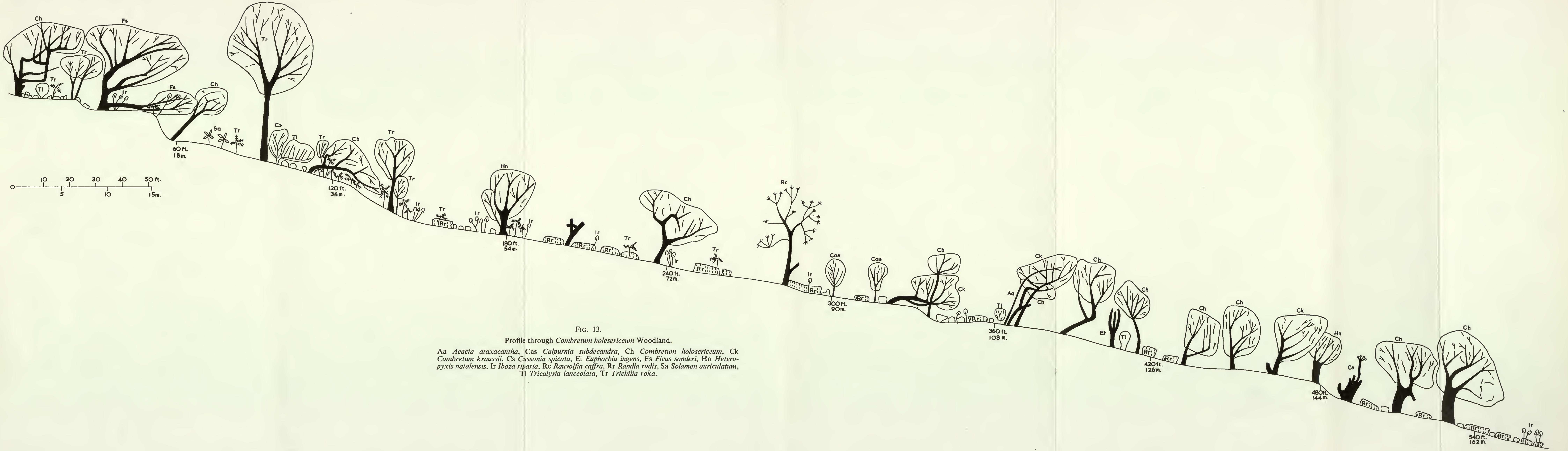

Fig. 13.

Profile through *Combretum holesericeum* Woodland.

Aa *Acacia ataxacantha*, Cas *Calpurnia subdecandra*, Ch *Combretum holosericeum*, Ck *Combretum kraussii*, Cs *Cussonia spicata*, Ei *Euphorbia ingens*, Fs *Ficus sonderi*, Hn *Heteropyxis natalensis*, Ir *Iboza riparia*, Rc *Rauvolfia caffra*, Rr *Randia rudis*, Sa *Solanum auriculatum*, Tl *Tricalysia lanceolata*, Tr *Trichilia roka*.

CHAPTER VIII.

KLOOF FOREST.

1. General Features.
2. Stratification.
3. Status of Kloof Forest.

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CHAPTER VIII.

KLOOF FOREST.

The succession in the Hydrosere to Streambank Forest and the succession in the Lithosere to Woodland, have been traced in Chapters III and VII. Kloof Forest represents the culmination of these two seres at highe relevations. A view of a portion of Kloof Forest is shown in Plate 17.

1. GENERAL FEATURES.

Kloof Forest is situated on south, south-east and south-west facing slopes where:—

1. Precipitation is high.
2. Evaporation rate is low.
3. Shade is cast by the adjacent cliffs during winter.
4. Protection is afforded from the dry Bergwinds prevalent during spring.

The composition of Kloof Forest is very mixed, and at Table Mountain it is especially so, for the reason that the area lies on the " line " dividing Natal into coast and inland climates (see page 15).

The tallest trees in Kloof Forest are up to 80 feet (24 m.) in height and include the following species named roughly in order of abundance:— *Trichilia roka, Combretum kraussii, Ficus capensis, F. natalensis, Protorhus longifolia, Celtis africana, Pygeum africanum, Fagara capensis, Rhus legatii, Sapium ellipticum, Rauvolfia caffra* and *Syzygium gerrardii.* None of these trees is dominant over an extensive area, but *Trichilia roka, Combretum kraussii, Protorhus longifolia, Pygeum africanum* and *Syzygium gerrardii* are locally dominant in various parts of Kloof Forest.

Forest of almost similar composition occurs at Little Noodsberg, north-east of Table Mountain, where *Protorhus longifolia* is dominant over a considerable area, while *Nuxia floribunda* is more frequent and grows to greater heights than at Table Mountain.

Kloof Forest as a whole tends to be open. The causes are twofold. Firstly, the forest areas are situated on slopes supporting numerous boulders, and secondly, the natives carry out intermittent felling of the trees.

With the attainment of Kloof Forest, there follows an increase in small trees, shrubs, field layer herbs, lianes and epiphytes.

2. STRATIFICATION.

Kloof Forest is not stratified into definite layers over the whole of its area. Mostly, the slopes on which Kloof Forest is situated are too steep to permit of stratification in its strictest sense, where each layer is ecologically dependent upon the one above. Where stratification does exist, the following synusiae may be distinguished:—

- (i) Dominant Tree Layer.
- (ii) Subordinate Tree Layers—
  - (*a*) Trees 25–50 feet (7·5—15 m.)
  - (*b*) Trees 15–25 feet (4·5—7·5 m.)
- (iii) Shrubs.
- (iv) Field Layer—
  - (*a*) Tall Herbs.
  - (*b*) Short Herbs.
- (v) Ground Layer.

(i) *Dominant Tree Layer.*

Trees of this layer, over 50 feet (15 m.) in height, form a closed canopy or else a discontinuous one, in which case they appear as emergents above the level of the subordinate tree layers.

Probably the most abundant tree of this layer in Kloof Forest is *Trichilia roka*, commonly known as Natal Mahogany (Plate 18). The bole of this tree is smooth and straight and bears a large umbrageous crown. Regeneration of *Trichilia roka* takes place very readily in spite of the fact that insects parasitize the red and black seeds.

The Bush Willow, *Combretum kraussii*, occasionally forms consociations. Some fine specimens of this tree are present in the Amatulu Forest, some with a height of 50 feet (15 m.) and a girth at breast height of 12 feet (4 m.). During autumn and winter the foliage takes on a brown-red colour.

Protorhus longifolia, an important coast forest tree, is not so abundant at Table Mountain as it is at Little Noodsberg, where it aggregates to form a pure and extensive consociation,

Pygeum africanum forms a closed canopy in one patch of forest with a south-east aspect. Red Stinkwood as it is known, is a valuable timber tree. *Sapium ellipticum* and *Rauvolfia caffra* are restricted to very moist parts of Kloof Forest. Certain waterfalls spilling over the side of the cliffs do not have a stream channel below; the perennial supply of water simply soaks into the ground and brings about streambank conditions favoured by *Sapium ellipticum* and *Rauvolfia caffra.* At Little Noodsberg, *Sapium ellipticum* sometimes occurs in pure stands.

Syzygium gerrardii, with a clean white bole, is dominant in part of the forest which extends along the top edge of a vertical cleft in the mountain. (Plate 19).

The rest of the trees belonging to the dominant layer do not form consociations. They include *Celtis africana*, *Fagara capensis*, *Ficus capensis*, *F. natalensis* and *Rhus legatii*. *Ficus natalensis* starts as an epiphyte or lithophyte. Specimens with a girth of 17 feet (5 m.) frequently hug large talus boulders.

(ii) *Subordinate Tree Layers.*

(*a*) *Trees* 25–50 *feet* (7·5–15 m..)

As with the dominant tree layer, this layer may or may not form a continuous canopy. Pure dominance of any one species is absent. The following trees comprise the layer:—*Trema guineensis*, *Allophylus dregeanus* *Rapanea melanophloeos*, *Gymnosporia penduncularis*, *Allophylus melanocarpus*, *Cassipourea gummiflua* var. *verticillata*, *Drypetes arguta*, *Cassipourea gerrardii*, *Seemannaralia gerrardii*, *Commiphora caryaefolia*, *Harpephyllum caffrum*, *Xymalos monospora*, *Ekebergia meyeri*, *Syzygium cordatum* and *Nuxia floribunda*.

Specimens of *Xymalos monospora* (Lemon wood) are not common—a contrast to Midland forests and the forest at Little Noodsberg. The dense shade cast by *Xymalos monospora* has repeatedly been referred to in works on Natal vegetation (Bews, 1925: 51). For light values under this tree, see Table IV.

(*b*) *Trees* 12–15 feet (3·5—4·5 m.)

Chrysophyllum natalense and *Oxyanthus gerrardii* are the most frequent trees of this layer. Both species cast dense shade.

Other trees comprising this layer are *Halleria lucida*, *Bersama tysoniana*, *Rawsonia lucida*, *Drypetes natalensis*, *Burchellia bubalina*, *Clerodendrum glabrum* and *Duvernoia adhatodioides*, the dominant tree of mesic talus slopes.

(iii) *Shrubs.*

Shrubs are numerous both in number and species. Several shrubs form pure communities. They include *Justicia campylostemon*, *Pavetta bowkeri*, *Oxyanthus gerrardii*, *Duvernoia adhatodioides* and *Cryptocarya woodii*. The rest of the shrubs are given in the following list: *Peddiea africana*, *Carissa bispinosa*, *Tricalysia lanceolata*, *Grumilea capensis*, *Solanum auriculatum*, *Popowia caffra*, *Gardenia globosa*, *Buddleia pulchella*, *Iboza riparia*, *Solanum giganteum*, *Pavetta* sp. (271), *Maerua racemulosa*, *Piper capense*, *Azima tetracantha* and *Cadaba natalensis*. *Maerua racemulosa*, *Azima tetracantha* and *Cadaba natalensis* are confined to dry parts of the forest.

A striking feature of the composition of the shrub layer is the large number of shrubs belonging to highly evolved sympetalous families. This gives support to Bews's contention (1925: 63) that the shrub form is derivative.

(iv) *Field Layer.*

The field layer may be divided into two sections depending on height.

(*a*) *Tall Herbs.*

Tall dicotyledonous herbs are invariably situated in open glades in the forest. *Hypoestes antennifera* and *Plectranthus* sp. (102), both with purple flowers and flowering during autumn, form pure societies in Kloof Forest. *Leonotis dubia* about 6 feet (2 m.) in height, presents an attractive sight when it flowers during autumn. Like *Leonotis leonurus* along the forest margin, it has brilliant orange-red flowers and is a favourite of the sunbirds. A less striking tall herb is *Pavonia meyeri* with pale pink flowers. *Hibiscus pedunculatus*, found in dry parts of the forest, does not establish pure societies.

The fern population of Kloof Forest in the Table Mountain area is exceptionally rich. Ferns are abundant in parts of the forest near the base of the cliff where conditions are very moist, for example in parts receiving spray from small waterfalls running down the cliff face. *Marattia fraxinea*, with fronds sometimes 6 feet (2 m.) long, favours such a habitat—likewise *Histiopteris incisa*, *Lonchitis stenochlamys* and *Todea barbara* (Plate 20.) *Todea barbara* possesses a definite trunk, and should in the opinion of the writer, be classed as a tree fern along with *Cyathea capensis* and *C. dregei*.

(*b*) *Short Herbs.*

This section includes a large number of plants belonging to widely divergent families. As with the tall ferns of the last section, these plants are most abundant in moist places of the forest, where the tree canopy is not too dense. During summer the forest floor is a mass of colour—a contrast to winter when the floor has a drab and scraggy appearance.

The following herbs frequently form pure field layer societies: *Lobelia pteropoda*, *Hypoestes triflora*, *Aneilema aequinoctiale*, *A. dregeanum*, *Plectranthus ciliatus*, *Clivia miniata*, *Streptocarpus gardenii*, *Impatiens duthieae*, *Begonia natalensis*, *Desmodium repandum* and *Clivia gardenii*. *Clivia miniata*, with a brick-red perianth and *Clivia gardenii*, with a yellow perianth and green-tipped segments, are characteristic of bouldery parts of the forest.

The above plants with the exception of *Clivia* spp. may also form mixed societies with one another or with one or more of the following plants which are not gregarious: *Galopina circaeoides*, *Stachys tubulosa*, *Drymaria cordata*, *Hypoestes verticillaris*, *Fleurya mitis*, *Conostomium natalense*, *Celosia trigyna*, *Pouzolzia parasitica* and *Phytolacca americana*. A mixed society is shown on Plate 21.

Of the grasses, *Oplismenus hirtellus* forma " *simplex* " and forma " *robusta* " are the most common. They produce very low-growing societies. *Ehrharta erecta* var. *natalensis* and *Setaria chevalieri* are occasional.

Cyperaceae present are *Cyperus albostriatus* and *Mariscus* sp. (691).

Among the ferns, *Blechnum capense*, *B. punctulatum* var. *krebsii*, *B. attenuatum*, *Asplenium friesiorum*, *A. splendens*, *Pteris quadriaurita*, *Dryopteris athamantica* and *Pityogramma austroamericana* contribute to mixed societies or occur in pure societies. The *Asplenium friesiorum* society covers a large area of the forest floor.

The flowering period of eleven forest herbs was noted from January to July, 1949. The curves plotted in fig. 14 are based on the observations made. *Lobelia pteropoda* flowers for nearly 6 months, while *Clivia gardenii* flowers for only 1 month.

(v) *Ground Layer.*

The constituent plants of this layer are about 3 inches (8 cm.) high and include various bryophytes, *Selaginella kraussiana* and the creeping *Crassula expansa.*

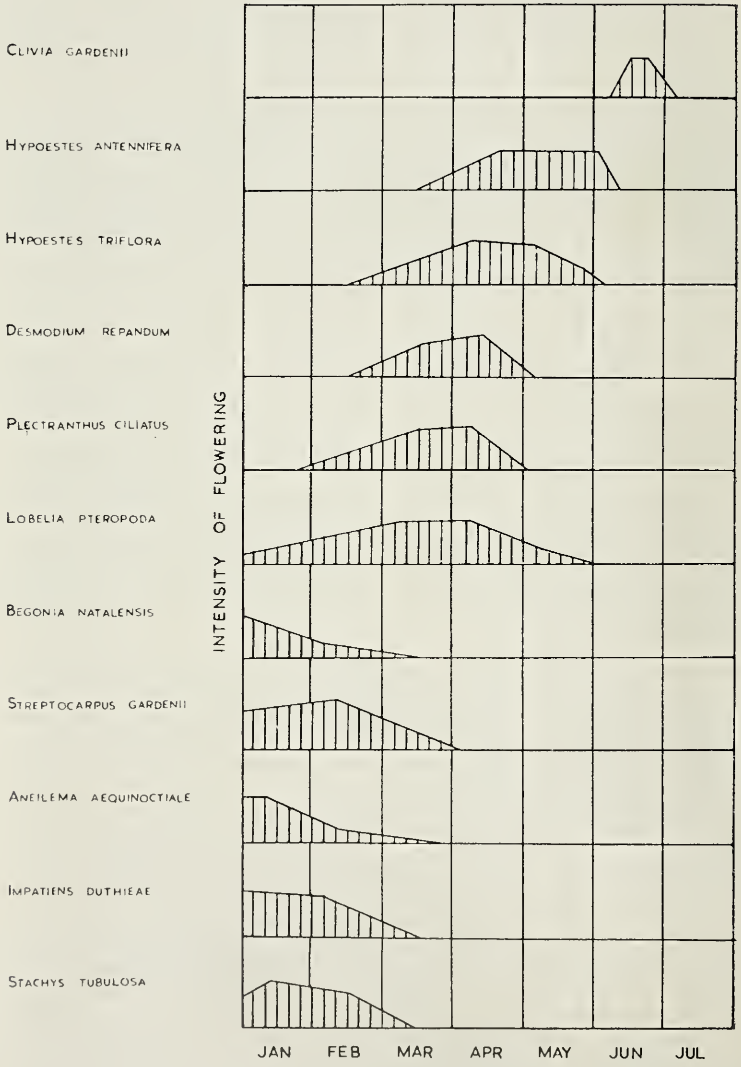

FIG. 14.

Flowering periods of eleven forest herbs.

3. STATUS OF KLOOF FOREST.

Determination of the sociological status of Kloof Forest is not easy. Absent in Kloof Forest at Table Mountain are *Podocarpus henkelii*, *P. falcatus* and *P. latifolius*—species which are dominant in both coast and midland climatic climax forests.*

Kloof Forest, according to the " monoclimax " doctrine of Clements, because of the absence of *Podocarpus* spp., would represent a stage inferior to the climatic climax, namely the subclimax. Continued reaction of the present dominants should lead to the entry of the yellowwoods.

The " polyclimax " theory on the other hand, takes into account the apparent stability and permanence of vegetation. According to Tansley (1935: 306): " a climax is a relatively stable phase reached by successional change. Change may still be proceeding within a climax, but if it is too slow to appreciate or too small to affect the general nature of the vegetation, the apparently stable phase must still be called a climax." In other words, a climax other than the climatic climax may exist in any climatic area. A cause should be found for the relative permanence of Kloof Forest or, what means the same thing: why is *Podocarpus* absent from Kloof Forest?

The possibility that edaphic conditions are unsuitable for *Podocarpus spp.* should be examined. Kloof Forest is apparently the only type of forest occurring on Table Mountain Sandstone-Granite formations in Natal. Soils derived from Table Mountain Sandstone are notoriously shallow and poor physically. Percolation of water through Table Mountain Sandstone soils is rapid—a factor conducive to the leaching of organic materials. In spite of these factors, *Podocarpus* spp. are often dominant elsewhere in in South Africa soils derived from Table Mountain Sandstone. The Knysna Forests, with *Podocarpus* spp. as the dominants, are stituated on Table Mountain Sandstone soils varying in quality (Phillips, 1931: 17). As far as soil depth is concerned, it may be mentioned that in the Drakensberg area, the writer has seen species of *Podocarpus* growing on talus slopes and sometimes as chasmophytes.

Certain biotic factors may be responsible for the absence of *Podocarpus* spp. It may be that the yellowwoods were dominant many years ago and and have since been selectively cut out. This alternative seems unlikely, for the reason that natives do not exploit timbers for commercial purposes.

Another possible cause of a biotic nature concerns the presence or absence in the soil of the nitrogen-fixing bacterium *Pseudomonas radicicola*, which is found in the nodules of *Podocarpus falcatus* and *P. latifolius*. Phillips (1931: 33, 34) conducted experiments which showed that:—

(1). *Pseudomonas radicicola* in nature, enters into symbiosis with the young plant (*Podocarpus falcatus* and *P. latifolius*) immediately on germination of the podocarpium.

(2) Bacteria-free seedlings can be grown in sterile soil for the space of several weeks, but are weak and finally succumb.

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* Since writing this account the writer has been informed that *Podocarpus latifolius* occurs in forest very close to the Table Mountain Area. Mr. M. J. Wells in a letter dated 12th October 1957, reports that "*Podocarpus latifolius* is quite common in a forest at the head of a valley south of Mpsana, on and below a south-facing krantz where a road between Wartburg and the Nagle Dam crosses the escarpment". This locality is about 7 miles north-east of Table Mountain.

(3). Such bacteria-free plants, when supplied with water containing even a portion of the bacterial content of a single small nodule, within a few days exhibit the presence of incipient nodules and gradually are able to assert themselves." It is possible that *Pseudomonas radicicola* or a certain strain of the bacterium is absent in the soil supporting Kloof Forest, with the result that the growth of the yellowwoods is rendered impossible.

The above discussion reveals no definite cause for the absence of *Podocarpus* spp., consequently it is only possible (following Tansley) to designate Kloof Forest as a climax type of vegetation, without affixing any prefix to the word climax.

CHAPTER IX.

KLOOF FOREST: GROWTH-FORM CHARACTERISTICS.

1. Tree and Shrub Heights.
2. Tree and Shrub Girths.
3. Plank Buttresses.
4. Spinosity.
5. Cauliflory.
6. Coppice Shoots.
7. Foliage.
8. Flowers.
9. Lianes.
10. Epiphytes.
11. Special growth forms.

CHAPTER IX.

KLOOF FOREST: GROWTH-FORM CHARACTERSITICS.

1. TREE AND SHRUB HEIGHTS.

Table VIII gives the mean height of mature Kloof Forest trees and shrubs.

TABLE VIII.

TREE AND SHRUB HEIGHTS.

Species.	Mean height of mature specimens.
Trichilia roka	Over 50 feet (15m.)
Combretum kraussii	
Ficus capensis	
Ficus natalensis	
Protorhus longifolia	
Celtis africana	
Pygeum africanum	
Fagara capensis	
Rhus legatii	
Sapium ellipticum	
Rauvolfia caffra	
Syzygium gerrardii	
Trema guineensis	25—50 feet (75—15m.)
Allophylus dregeanus	
Rapanea melanophloeos	
Gymnosporia peduncularis	
Allophylus melanocarpus	
Cassipourea gerrardii	
Commiphora caryaefolia	
Harpephyllum caffrum	
Xymalos monospora	
Ekebergia meyeri	
Syzygium cordatum	
Nuxia floribunda	
Croton sylvaticus	
Chrysophyllum natalense	12—25 feet (3·5—7·5m.)
Oxyanthus gerrardii	
Halleria lucida	
Bersama tysoniana	
Rawsonia lucida	
Drypetes natalensis	
Burchellia bubalina	
Clerodendrum glabrum	
Duvernoia adhatodioides	
Kiggelaria africana	
Scolopia ecklonii	
Erythroxylum pictum	
Cryptocarya woodii	6—12 feet (2—3·5 m.)
Carissa bispinosa	
Peddiea africana	
Gardenia globosa	
Grumilea capensis	
Maesa lanceolata	

Species.	Mean height of mature specimens.
Maerua racemulosa	0—6 feet (0—2m.)
Pavetta bowkeri	
Pavetta sp. (271)	
Justicia campylostemon	
Popowia caffra	
Piper capense	
Azima tetracantha	
Buddleia pulchella	

2. Tree and Shrub Girths.

The mean girth of mature Kloof Forest trees and shrubs is given in Table IX.

Table IX.

MEAN GIRTHS OF TREES AND SHRUBS.

Species.	Mean girths of trees and schrubs.
Combretum kraussii	12–17 feet (3·5–5 m.)
Ficus natalensis	
Pygeum africanum	
Trichilia roka	6–12 feet (2–3·5 m.)
Ficus capensis	
Protorhus longifolia	
Rhus legatii	
Celtis africana	
Sapium ellipticum	
Gymnosporia penduncularis	
Rapanea melanophloeos	
Fagara capensis	4–6 feet (1·2–2 m.)
Syyzgium gerrardii	
Seemannaralia gerrardii	
Harpephyllum caffrum	
Cassipourea gerrardii	
Ekebergia meyeri	
Trema guineensis	2–4 feet (0·6–1·2 m.)
Xymalos monospora	
Cassipourea gummiflua var. *verticillata*	
Commiphora caryaefolia	
Duvernoia adhatodioides	
Allophylus melanocarpus	
Allophylus dregeanus	
Erythroxylum pictum	
Syzygium cordatum	
Drypetes natalensis	
Kiggelaria africana	
Nuxia floribunda	
Chrysophyllum natalense	
Croton sylvaticus	
Drypetes arguta	

Species.	Mean girths of trees and schrubs.
Halleria lucida *Clerodendrum glabrum* *Dombeya natalensis* *Burchellia bubalina* *Scolopia ecklonii* *Cryptocarya woodii* *Gardenia globosa* *Oxyanthus gerrardii* *Bersama tysoniana*	1–2 feet (0·3–0·6 m.)
Carissa bispinosa *Peddiea africana* *Maerua racemulosa* *Azima tetracantha* *Pavetta bowkeri* *Pavetta* sp. (271) *Piper capense* *Justicia campylostemon* *Popowia caffra* *Buddleia pulchella*	0–1 foot (0–0·3 m.)

3. PLANK BUTTRESSES.

The plank buttresses of the few trees which do exhibit them, are never very well developed. The following trees possess plank buttresses: *Ficus capensis*, *F. natalensis*, *Trichilia roka*, *Celtis africana* and *Combretum kraussii.*

4. SPINOSITY.

The following trees and shrubs are armed: *Rhus legatii* (coppice shoots only), *Scolopia gerrardii*, *S. ecklonii*, *Carissa bispinosa*, *Azima tetracantha* and *Canthium* spp.

5. CAULIFLORY.

Halleria lucida, *Ficus capensis*, *Drypetes natalensis* and *Rapanea melanophloeos* are cauliflorous.

6. COPPICE SHOOTS.

A considerable number of trees and shrubs produce coppice shoots. Some of these trees play an important part in regeneration by producing vigorous coppice growths after felling.

Species developing coppice shoots include *Seemannaralia gerrardii*, *Xymalos monospora*, *Rhus legatii*, *Rapanea melanophloeos*, *Halleria lucida*, *Cryptocarya woodii*, *Combretum kraussii*, *Rawsonia lucida*, and *Syzygium gerrardii*.

7. FOLIAGE.

The majority of forest species are evergreen—a contrast to the Thornveld of the lowlands where most of the trees are deciduous. Deciduous species, regular and otherwise, do occur and include *Celtis africana*, *Ficus capensis*, *Rhus legatii*, *Combretum kraussii*, *Croton sylvaticus*, *Commiphora caryaefolia*, *Bersama tysoniana*, *Seemannaralia gerrardii*, *Clerodendrum glabrum* and *Kiggelaria africana*.

Of the woody lianes, *Cissus hypoleuca* is deciduous.

Kloof Forest trees and shrubs possess, for the most part, simple leaves. Exceptions are *Trichilia roka, Fagara capensis, Rhus legatii, Harphephyllum caffrum, Allophylus melanocarpus, Bersama tysoniana, Commiphora caryaefolia, Cussonia spicata* and *Ekebergia meyeri.*

Climbers with compound leaves are *Cissus hypoleuca, Dalbergia obovata* and *Cnestis natalensis.*

8. FLOWERS.

With the exception of *Nuxia floribunda* trees over 25 feet (7·5 m) have rather inconspicuous flowers. Trees and shrubs below 25 feet (7·5 m) on the other hand, possess showy flowers, for example *Halleria lucida* (tubular red corolla), *Duvernoia adhatodioides* (large white flowers), *Burchellia bubalina* (tubular orange corolla), *Gardenia globosa* (large white flowers) and *Carissa bispinosa* (white flowers).

Certain climbers possess showy flowers, for example *Senecio tamoides, S. macroglossus, S. brachypodus, Ipomoea ficifolia, Cadaba natalensis, Oncinotis inandensis, Canthium guenzii* and *Acridocarpus natalitius.*

Pollinating agents include shade-loving butterflies, bees and sunbirds. Several swarms of bees are located in Kloof Forest at Table Mountain.

9. LIANES.

Lianes are well represented in Kloof Forest. They serve to knit together a rather open canopy. *Cissus hypoleuca* is perhaps the most abundant liane. *Rhoicissus capensis,* also abundant, has the thickest stem [9 inches (23 cm.) diameter] and climbs to the greatest heights. The very attractive, yellow-flowered *Acridocarpus natalitius* with winged fruit, is frequent. Other woody lianes present in Kloof Forest are *Oncinotis inandensis* casting very very dense shade, *Dalbergia obovata, D. armata, Popowia caffra, Canthium guenzii, Cnestis natalensis, Smilax kraussiana, Buddleia dysophylla* and *B. pulchella.*

Herbaceous climbers include *Mikania cordata, Melothria membranifolia, Senecio tamoides, Cissus fragilis, Rubia cordifolia, Senecio macroglossus, Ipomoea ficifolia, Riocreuxia torulosa, Senecio brachypodus* and *Potamophila prehensilis.*

10. EPIHYTES.

Apart from lichens, epiphytes are not abundant in Kloof forest.

Crustaceous lichens are chiefly epiphloeodal i.e. they are not immersed in the bark to any great extent. They show a preference for smooth bark—a feature of young trees and of certain adult trees. The following crustaceous lichens were collected in Kloof Forest: *Bacidia* sp. (531), *Lecidea* sp. (579), *Caloplaca* sp. (540), *Graphis* sp. (535), *Arthronia* sp. (536), *Haemotomma puniceum, Crocynia* sp. (580), *Lecidea* sp. (534), *Buellia* sp. (538), *Arthronia* sp. (569) and *Caloplaca* sp. (581).

Foliose lichens are most abundant on bark which is scored with cracks and is water-retaining. They include *Sticta aurata* var. *subglaucesens, Parmelia* sp. (576), *Anaptychia* sp. (557), *A. speciosa* var. *esorediata, Parmelia* sp. (578) and *Physica* sp. (537).

Of the fruticose lichens, various species of *Usnea* are frequent. Apart from the Usneas, *Anaptychia leucomelanos*, *Teloschistes validus* and *Ramalina* sp. (575) are common.

Moss communities often establish themselves on the spreading branches of trees which receive continuous spray from waterfalls. The mosses produce a thick layer of humus, which is soon invaded by vascular cryptogams.

Among the ferns *Lycopodium gnidioides, L. verticillatum* (Plate 22), *Asplenium rutaefolium*, *Polypodium ecklonii* and *P. schraderi* are epiphytic.

The two orchids *Stenoglottis fimbriata* and *Mystacidium capense* are abundant in the Amatulu Forest.

Dicotyledonous epiphytes present are *Peperomia reflexa, Streptocarpus gardenii* and the " strangler fig, " *Ficus natalensis.*

11. SPECIAL GROWTH FORMS.

(*a*) *Tree Ferns.*

The only true forest tree fern is *Cyathea capensis*, which occurs in large clumps in moist places usually near the base of the cliff. (Plate 23). *Cyathea dregei* is sometimes found along the forest margin.

Todea barbara has been referred to on page 82; it is a short tree fern.

(*b*) *Monocotyledonous Trees.*

(i). *Phoenix reclinata.*

The palm *Phoenix reclinata* occurs occasionally in forest, where it attains a height of 25 feet (7·5 m.) It does not form clumps as it is wont to do in Streambank Scrub.

(ii). *Strelitzia nicolai.*

The wild banana, *Strelitzia nicolai* forms small consocies in parts of Kloof Forest situated near the base of the mountain. It is a migrant from the coast.

(iii). *Dracaena hookeriana.*

Dracaena hookeriana is a short tree about 5–6 feet (1·5—2 m.) in height. It is occasional in Kloof Forest.

CHAPTER X.

BIOTIC FACTORS.

A. THE INFLUENCE OF MAN.

- 1. UTILIZATION OF INDIGENOUS FLORA.
  - (*a*) KRAAL CONSTRUCTION.
  - (*b*) FIREWOOD.
  - (*c*) FOOD AND MEDICINE.
  - (*d*) MISCELLANEOUS USES.
- 2. DOMESTIC ANIMALS.
- 3. FIRE.
- 4. CULTIVATION.

B. BIRDS.

C. MAMMALS.

CHAPTER X.

BIOTIC FACTORS.

A. THE INFLUENCE OF MAN.

The Inanda Reserve, like most Native Reserves in the country, supports thousands of natives who exploit their land and vegetation without thought of tomorrow.

1. UTILIZATION OF INDIGENOUS FLORA.

(*a*) *Kraal Construction.*

The construction and repair of huts by natives is chiefly undertaken between April and August; the choice of this portion of the year for building activities is traceable to their anxiety to keep warm during winter and to remain dry the following rainy season.

Whether the natives use wattle wood or indigenous trees for hut construction depends upon the distance of their habitations from Mr. Ferreira's wattle plantation. Parties of native women carrying wattle poles are frequently encountered along the many footpaths present in the reserve. Indigenous trees suitable for hut building usually have hard wood, for example *Fagara capensis*, *Ficus capensis* and *Trichilia roka*. Besides mature trees, numerous saplings are cut out by the natives.

For the thatching of roofs, the grasses *Cymbopogon marginatus*, *Hyparrhenia cymbaria* and *H. hirta* provide the main material. In order to keep the thatch securely fixed to the wooden framework of the roof, a woven net is placed over the whole structure. These nets are made out of *Danthonia macowanii* (isi-Konko) and the iridaceous *Dierama* sp. (712) (i-Tembu). The leaves of *Danthonia macowanii* possess a great tensile strength when dry. Considerable effort is necessary to procure this grass, which occurs high up on moist cliff faces. *Dierama* sp. (712) is frequent in the grassveld on top of the mountain.

Natives owning cattle erect a circular cattle enclosure or palisade near their huts. A great number of poles, usually of indigenous origin, are used in their construction. No selection is exercised in the choice of the wood; both hard wooded and soft-wooded trees and shrubs are indiscriminately used. Even *Urera tenax*, a soft-wooded shrub with an urticating trunk and leaves, is cut out for this purpose.

Boundary fences surrounding huts and cattle enclosures are chiefly made out of indigenous trees. Natives prefer a living fence which is durable and can withstand grassfires to one composed of dead timber. Thus, they plant truncheon cuttings of trees which strike root easily. *Erythrina caffra* is frequently used. Aesthetic appreciation of this tree with its racemes of brilliant red flowers, probably contributes to its selection. The succulent *Euphorbia tirucalli* surrounds many kraals. As has been indicated on Page 53, the present abundance of this tree is possibly due to its extensive cultivation and subsequent spread. A species of *Bougainvillea* is sometimes interspersed between the cuttings of *Euphorbia tirucalli.* The introduced *Caesalpinia decapetala* often forms an impenetrable living fence or thicket. Kloof Forest trees frequently grow up in the shade cast by *C. decapetala.*

(*b*) *Firewood.*

Wattles and slow-burning indigenous trees and shrubs provide fuel for the natives.

Kloof Forest suffers from the selective cutting out of suitable species for firewood. The open nature of the forest at Table Mountain is due largely to the intermittent felling of trees and shrubs by native women armed with axes and cane knives.

The removal of forest trees and shrubs, whether for firewood or hut building, produces areas on which subseres may develop. Prominent in the initial stages of the secondary succession is the bug-tree, *Solanum auriculatum.* This introduced tree or shrub, with bird-sown seeds is very aggressive and forms large consocies in forest. It often attains a height of 17 feet (5 m.) and a girth of nearly 3 feet (1 m.). Other plants which enter subseral areas include *Pteridium aquilinum*, *Maesa lanceolata* and *Solanum giganteum.* Forest species soon develop under the canopy of the above plants. Edaphic conditions have already been improved in the prisere and all the forest species need is an amelioration of atmospheric conditions.

The Thornveld is also a source of firewood. The secondary nature of the Thornveld is due to the extensive cutting out of *Acacia* spp. Certain grassveld areas in the lowlands were once obviously occupied by Thornveld. (Plate 24). Indicators of former thornveld areas are:—

1. The presence of old specimens of *Euphorbia ingens* and *Cussonia spicata*, left because of their poor fuel value.
2. The presence of patches of *Randia rudis*—a shrub, which grows in the shade of *Acacia* spp.

A specimen of *Protea roupelliae* in the National Herbarium, Pretoria collected by McLean (his number 145) in 1926 proves that this plant once grew in the Table Mountain Area. McLean described it as " fairly common on the eastern slope of the mountain ". The present writer saw no signs of *P. roupelliae.* All over South Africa tree Proteas are used by natives for fuel.

(*c*) *Food and Medicine.*

The fruits of certain trees and shrubs are eaten by the natives, though they do not form a regular part of their diet. The writer has seen natives eating the fruits of the following plants: *Chrysophyllum natalense*, *Harpephyllum caffrum*, *Syzygium cordatum*, *Strychnos spinosa*, *Vangueria infausta*, *Cryptocarya woodii* and *Ximenia americana.*

The underground organs of certain geophytes are also eaten, for example, the rootstock of *Ipomoea simplex*. According to historical evidence, many natives were forced to live on geophytes during the invasion of Natal by Chaka in 1820. Russell (1891: 125) mentions that the Amanyamvu tribe, living on the right bank of the Umgeni River below Table Mountain, were able to defy Chaka for some time, because of the facilities for concealment afforded by the mountainous country. Table Mountain Area probably lost many of its geophytes during this period.

Indigenous plants provide natives with many of their medicines. The bark of *Harpephyllum caffrum* is used for stomach troubles. Most specimens of this tree possess mutilated bark. The leaves of *Sapium ellipticum* are used for the same purpose. The large brown roots of *Pentanisia prunellioides* are ground up into fine powder and used as an emetic or enema. The woody climber *Oncinotis inandensis*, known as the sarsparilla plant, is said to be a " purifier of the blood. "

(*d*) *Miscellaneous Uses.*

The selection of wood for walking sticks or weapons is a matter of great concern to most native men. The natives show a preference for sticks made out of *Gymnosporia peduncularis* (in- Qai).

The juice of *Protorhus longifolia* and *Ficus natalensis* is used as bird lime. Considerable damage to the bark is involved in the removal of the juice.

The weaving of mats by native women entails the use of *Dierama* sp. (712), *Phragmites mauritianus*, *Cyperus latifolius* and *C. sexangularis*.

2. DOMESTIC ANIMALS.

Native stock consists of cattle, goats and horses. The prosperity of a native is measured by the number of cattle he owns.

The movement of cattle in the Table Mountain Area follows the same cycle every year. In May the natives withdraw their cattle from the commonage on top of the mountain and other grassveld areas, and feed them on mealie stalks. When the stalks are finished, the cattle make the best of grasses *Cymbopogon marginatus*, *Hyparrhenia hirta*, *H. cymbaria* and *Beckeropsis uniseta* present between cultivated fields. At this stage many cattle are herded into the forests, where they browse herbs and the lower leaves of shrubs and trees. A few weeks after the grass has been burnt, the cattle return to their pastures where they feed on the young grass shoots only a few inches high.

The weekly movement of cattle to the various dips in the reserve brings about the formation of a multitude of paths. These paths act as watercourses for the transport of water during heavy storms. Erosion of the soil results and ultimately dongas are formed.

The overstocking of grassveld is rife everywhere in the reserve. In Chapter IV it was seen how overgrazing has been largely responsible for the throwing back of the sere to the *Aristida junciformis* stage. An important result of overgrazing is that fires cannot burn with sufficient intensity to adversely affect the young *Acacia* spp. in the Thornveld. Thicket formation follows.

Goats occur in great numbers and are responsible for the cropping of shrubs and small trees.

3. FIRE.

The burning of grassveld areas is carried out regularly in July and August every year. The effects of fire on vegetation have been referred to at intervals in the preceding pages, consequently it is only necessary to summarize them very briefly at this stage.

1. Fire may have contributed to the " throwing back " of the grassveld succession to the *Aristida junciformis* stage.
2. Late winter and spring burning brings about an increase in vernal aspect plants, but a decrease in autumnal aspect plants.
3. The extension of forest is hindered by fire.

Two species which have disappeared from the summit or near-summit of Table Mountain, possibly as a result of fire, are *Buddleia salviifolia* and *Royena cordata*. *Buddleia salviifolia* was collected by Krauss (his number 447) between 1838 and 1840 (Krauss *et al.*, 1844: 834) and *Royena cordata* by McLean (his number 167 in the National Herbarium, Pretoria) in 1926.

4. CULTIVATION.

The winter aspect of the reserve reveals to what extent the area is cultivated; the reserve presents a patchwork picture of bare, red-coloured fields mixing with brown treeveld and grassveld.

Natives cultivate almost any land with the exception of the top of the mountain. Native superstition has it that any disturbance of the soil on top of the mountain will earn the displeasure of the Supreme Being, who in His wrath will cause torrential rains and hail to fall. The writer was blamed for the heavy hailstorm of February 6th, 1949 and was subseqently informed that if plants were dug up at all on the mountain, the disturbed soil was to be carefully replaced. Steep slopes are cultivated and even bouldery regions. In the latter case, the small boulders are collected and heaped on larger immovable ones.

Cultivation necessitates the removal of indigenous flora. Relics, both living and dead, of former plant communities are present in many cultivated fields. In the Thornveld *Cussonia spicata* and *Euphorbia ingens* are usually left untouched, while fields adjacent to streams frequently contain specimens of *Dracaena hookeriana*—a relic of Streambank Forest.

The natives rely upon mealies (*Zea mays*) as their chief source of food. Besides mealies, kaffir corn (*Sorghum caffrorum*), pumpkins (*Cucurbita pepo* forma), beans (*Phaseolus vulgaris*), native sugarcane (*Sorghum mellitum*), monkey nuts (*Arachis hypogaea*) and madumbies (*Colocasia esculenta*) are planted. The more progressive kraals also grow bananas (*Musa paradisiaca* subsp. *sapientum*) sweet oranges (*Citrus sinensis*), papaws (*Carica papaya*) and pineapples (*Ananas comosus*).

B. BIRDS.

Birdlife is abundant in the Table Mountain Area. The cliffs with their numerous ledges and pockets, and the different vegetation types all support their own characteristic bird populations. Birds occur in greatest numbers along the line of junction between diverse vegetation. This is apparently a universal phenomenon, for Bennett (1947: 287) refers to wildlife as a " phenomenon of the edge ".

Birds are important as dispersal agents of many of the plant species in the Table Mountain Area. The majority of Kloof Forest trees and shrubs have seeds or fruits which are dispersed by birds.

Pockets in the Table Mountain Sandstone outcrops on top of the plateau near the edge often contain bird faeces and undigested seeds. Samples of ten different seeds were collected and planted. Of this number only two species germinated. They were subsequently identified as *Rauvolfia caffra* and *Spirostachys africana.* The former is a streambank tree with drupaceous fruit about 2 cm. in diameter, while the latter with small globose fruit, is a constituent of Thornveld occurring in the valleys surrounding Table Mountain. The seeds of *Rauvolfia caffra* are large—a fact which points to a large bird as being responsible for its dispersal. Of the frugiverous birds, the Rock-pigeon is the largest and most frequent visitor to the top edge of the mountain.

The diet of a few frugiverous birds was noted. The Red-winged Starling, a gregarious bird flying considerable distances from the cliffs where it nests in summer, has been seen to eat the fruits of *Ficus natalensis* and *Maesa lanceolata.* The Black-eyed Bulbul and the Green White-eye are fond of the berries of *Solanum auriculatum.* The latter birds also feed on the small black fruits of *Trema guineensis.* The Cape Glossy Starling and the Purple-crested Lourie apparently enjoy the swollen orange capsules of *Croton sylvaticus.* The Lourie is liable to extinction in the Table Mountain Area; the natives use the wings for personal adornment and pay up to ten shillings per pair for them.

Other fruit and grain eating birds are the Redwing Partridge, Speckled Coly, Natal Francolin, Tambourine Dove, Black-collared Barbet, Icterine Canary (Yellow-eye), Common Waxbill and the South African Ruddy Waxbill. The Redwing partridge nests in the Grassveld ontop of the mountain in February. When a native discovers a partridge nest containing eggs (usually five) and no parent, he leaves the eggs and ties conspicuous knots in the leaves of nearby *Dierama* sp. (712). He returns later in the hope of killing the bird, which seems to prefer concealment to flight.

The following list includes some of the insectivorous birds found in the Table Mountain Area: Crowned Hornbill, Tawny-headed Grass Warbler, Cape Longclaw, Spotted-backed Weaver, Boubou Shrike, Redbilled Hoopoe, African Pied Wagtail, Cardinal Woodpecker and Hadedah Ibis.

Soon after the grassveld is burnt on top of the mountain in July, numerous birds arrive apparently intent on catching insects easily spotted between burnt tufts of grass. The Black-winged Plover, inconspicuous at other times of the year, is prominent. The large Southern Ground Hornbill and the Hadedah Ibis are also common.

Birds typically frequent along the Umgeni and Umsindusi Rivers are the Brown-hooded Kingfisher, Cape Stone Chat and the Black Duck. According to Ridley (1930: 488, 489), ducks are important as dispersal agents of the family Cyperaceae.

A few large birds subsist on small vertebrates. They include Hadedah Ibis, Jackal Buzzard, Southern Ground Hornbill, Cape Raven, Martial Eagle and an unidentified owl.

The diet of sunbirds consists of insects and nectar. A number of species occur at Table Mountain but only the Black Sunbird has been identified with any certainty. According to Schimper (1903: 121—5) the sunbirds of New Zealand show a preference for red flowers. Rycroft (unpublished thesis, 1943: 171) found that the sunbirds in the Karkloof Area of the Natal Midlands exhibited a similar preference, for example for *Burchellia bubalina*, *Erythrina caffra*, *Aloe* spp. and *Leonotis leonurus.* The present writer has seen sunbirds busy with the red or orange flowers of *Burchellia bubalina*, *Aloe aborescens*, *A. candelabrum*, *Leonotis leonurus*, *L. dubia* and the parasite *Loranthus dregei.*

Identified birds occurring in the Table Mountain Area together with their Zulu names and general remarks, are listed in Table X. The scientific names are those given by Roberts in " Birds of South Africa (1940)."

TABLE X.

BIRDS OCCURRING IN THE TABLE MOUNTAIN AREA.

Ornithological Name	Common Name	General Remarks.
Bubulcus ibis............	Cattle Egret............ i-Landa.	Eats insects. Frequent near cattle.
Melanopelargus niger......	Black Stork............ u-Nogolantethe.	Rare near cliffs.
Ciconia ciconia ciconia....	White Stork............ in-Gwagwane	Eats insects.
Hagedashia hagedash hagedash	Hadedah Ibis........... i-Nkankane.	Feeds on insects and small vertebrates. Common.
Anas sparsa sparsa.......	African Black Duck..... i-Dada	Restricted to rivers. Usually in pairs.
Polemaetus bellicosus.....	Martial Eagle..........	Rare
Pterolestes rufofuscus.....	Jackal Buzzard........ in-Hlandlokazi	Subsists on small vertebrates. Nests on cliff ledges.
Scleroptila levaillanti levaillanti	Redwing Partridge...... i-thendele	Eats insects and seeds. Nests on top of mountain in grassveld.
Chaetopus natalensis......	Natal Francolin......... isi-Khwehle	Occasional in forest
Numida mitrata.......... *mitrata*	Crowned Guineafowl... i-Mpangele	Feeds on insects and seeds. Gregarious. Common.
Titihoia melanoptera minor	Black-winged Plover.... i-Titihoye	Eats insects. Frequent on top of mountain after burning.
Dialiptila phaeonota phaeonota	Cape Rock Pigeon...... i-Juba	Graniverous. Gathers in large flocks. Nests in cliff.
Tympanistria tympanistria tympanistria	Tambourine Dove...... isi-Bhelu	Graniverous and frugiverous. Occasional in forest and thornveld.

Ornithological Name.	Common Name	General Remarks.
Gallirex porphyreolophus . .	Natal purple-crested Lourie, i-Gwalagwala	Frugiverous. Seen feeding on fruits of *Croton sylvaticus* in forest.
Chrysococcyx intermedius sharpei	Southern Emerald Cuckoo u-Bantwanyama	Rare
	Owl (Marsh or Eagle Owl) isi-Khova	Feeds on small vertebrates. Lies up in vlei on top of mountain during daytime. In parties of about 8.
Rhabdocolius striatus striatus	Speckled Coly, in-Dlazi	Frugiverous. Frequent along margin of forest.
Chelicutona albiventris albiventris	Brown-hooded Kingfisher u-Zangozolo	Insectivorous. Frequent along rivers and occasional along forest margin.
Phoeniculus purpureus purpureus	Red-billed Hoopoe, u-Nukani	Insectivorous. Frequent in thornveld and along margin of forest.
Bucorvus cafer	Southern Ground Hornbill, in-Singizi	Eats insects and small vertebrates. Usually in groups of 4 or 5 walking over burnt grass or cultivated fields.
Lybius torquatus torquatus.	Black-collared Barbet, is-Bagweba	Frugiverous. Frequent in thorn veld.
Dendropicus fuscescens fuscescens	Cardinal Woodpecker . . . isi-Qophamuthi	Occasional in thornveld.
Bluchanga adsimilis adsimilis	Fork-tailed Drongo. . . . . i-Ntengu	Insectivorous. Frequent in thornveld.
Corvultur albicollis	Cape Raven, i-Gwababa.	Eats chickens and eggs. Nests on cliff ledges. Frequent.
Parvus niger	Natal Black Tit . . . . isi-Cubujeje	Insectivorous. Occasional along forest margin.
Loidorusa tricolor tricolor.	Black-eyed Bulbul. . . . . . . i-Phothwe	Frugiverous. Fond of berries of *Solanum auriculatum*. Abundant.
Petrornis rupestris	Cape Rock Thrush . . . . . isi-Khwelatsheni	Insectivorous. Common on top of mountain.
Saxicola torquata torquata.	Cape Stone Chat . . . . i-Sangwabe, isi-Nqawane	Insectivorous. Occasional along streams.
Cossypha dichroa	Noisy Robin, u-Gedegede	Insectivorous. Occasional in forest.
Caffrornis caffra caffra	Cape Robin, u-Gaga	Insectivorous. Occasional in forest.
Dryodromas fulvicapilla fulvicapilla	Tawny-headed Grass Warbler, u-Nqcede	Insectivorous. Frequent in grassveld on top of mountain.

Ornithological Name.	Common Name.	General Remarks.
Motacilla vidua..........	African Pied Wagtail.... um-Vemve	Insectivorous. Frequents rivers.
Macronyx capensis capensis	Cape Longclaw, i-Gleeva and i-Nqomfi	Insectivorous. Frequent on top of mountain in grassveld.
Fiscus collaris collaris.....	Fiscal shrike, i-Qola....	Eats insects and small vertebrates. Frequent.
Laniarius ferrugineus ferrugineus	Boubou Shrike......... i-Bhobhoni	Insectivorous. Occasional.
Lamprocolius nitens.......	Cape Glossy Starling.... i-Gwinsi	Frugiverous. Seen eating capsules of *Croton sylvaticus*. Frequent.
Amydrus morio morio.....	Red-winged Starling.... i-Somi	Frugiverous. Seen eating fruits of *Ficus natalensis and Maesa lanceolata*
Chalcomitra amethystina amethystina	Black Sunbird.......... i-Ncwincwi	Feeds on nectar and insects. Frequent.
Zosterops virens virens....	Green white-eye........ u-Mantuntu	Frugiverous. Seen feeding on fruits of *Trema guineensis and Solanum auriculatum.*
Hyphantornis spilonotus...	Spotted-backed Weaver.. i-Hlokohloko	Subsists on insects and seeds. Abundant.
Lagonosticta rubricata.....	S. African Ruddy Waxbill, isi-Cibili and ubu-Cubu	Graniverous. Frequent in tall *Cymbopogon marginatus* between cultivated fields.
Estrilda astrild astrild.....	Common Waxbill....... i-Ntiyane	Graniverous. Occasional in forest and thornveld.
Serinus mozambicus mozambicus	Yellow-eye, uMbalane..	Insectivorous. Common along forest margin.

C. MAMMALS.

Apart from man and his domestic animals, mammals are very poor in numbers and species at Table Mountain. Natives, always on the hunt, are responsible for the paucity of wild fauna.

Probably the most abundant animal in the area, is the " dassie ", *Procavia capensis.* It takes up residence on cliff ledges and on bouldery talus slopes. According to the natives the animal is very fond of the leaves of *Erythrina latissima.* Forest herbs are closely cropped by the " dassie."

The Vervet Monkey, *Cercopithecus pygerythrus*, does not occur in great numbers. Troops of monkeys launch frequent raids on the native mealie fields. Certain geophytes are eagerly sought after by the monkeys. It is common to come across partly eaten bulbs, which have been dislodged from cliff ledges.

Baboons were until recently present in the Table Mountain Area. The natives believe that the daily blasting at the Umgeni Dam (during its construction) drove them away. According to the natives the baboons were in the habit of swarming on top of the mountain just after burning of the grassveld, in order to feed upon the underground organs of vernal aspect plants.

Appendix A.

CHECK LIST.

The collection of vascular flora given in this list may be regarded as representative. The collection of lichens and bryophytes, however, is far from complete.

Species accompanied by the writer's number are lodged in the herbarium of the University of Natal. A duplicate set of the lichens collected in the Table Mountain Area is housed at the Bolus Herbarium, Capetown. Duplicates of a large number of the angiosperms have been sent to the National Herbarium, Pretoria.

The following authorities have been followed in the arrangement of the families and genera:—

Lichens: Smith (1921).
Pteridophytes: Christensen (Verdoorn, 1938).
Angiosperms: Phillips (1926).

LICHENS.

ARTHRONIACEAE.

Arthronia sp.
Epiphloeodal on forest trees. Occasional.............. 536

Arthronia sp.
Epiphloeodal on forest trees. Occasional.............. 569

GRAPHIDACEAE.

Graphis sp.
Epiphloeodal on forest trees. Occasional............... 535

ROCELLACEAE.

Rocella montagnei Bel.
Frequent on dry cliff face............................

Rocella sp.
Abundant on dry cliff face............................ 546

CHRYSOTRICHACEAE.

Crocynia sp. or leprose form of some other lichen.
Epiphloeodal on forest trees. Occasional............... 580

LECIDEACEAE.

Lecidea sp.
Epiphloeodal on forest trees. Frequent................ 534

Lecidea sp.
Epiphloeodal on forest trees. Occasional............... 579

Bacidia sp.
Epiphloeodal on forest trees. Frequent................ 531

Bacidia sp.
Epiphoeodal on forest trees. Occasional................ 582

Lopadium sp.
Foliose lichen. Rare on forest trees.................. 572

CLADONIACEAE.

Baeomyces sp.
Terricolous on moist walls of sinkholes. Locally frequent. 553

Cladonia sp.
Terricolous in moist parts of forest. Occasional......... 547

Cladonia sp.
Occasional in moss mats............................ 567

COLLEMACEAE.

Leptogium bullatum Mont.
Gelatinous lichen. Locally frequent on sinkhole trees... 190

Leptogium tremelloides S. Grey.
Gelatinous lichen. Occasional on forest trees........... 573

STICTACEAE.

Sticta aurata Ach. var. *subglaucescens* Cromb. The var. here is an epharmonic form due to shade and moisture............
Foliose lichen. Frequent on trees in forest and in sinkholes... 191

Lobaria sp.
Foliose lichen. Locally frequent on sinkhole trees....... 189

PERTUSARIACEAE.

Killick (554).
Crustaceous on boulders near top edge of mountain. Abundant.. 554

LECANORACEAE.

Lecanora sp.
Crustaceous on boulders near top edge of mountain. Frequent.. 555

Lecanora sp.
Crustaceous on flat rock outcrops near top edge of mountain.. 560

Haematomma puniceum Mass.
Epiphloeodal on forest trees. Occasional.............. 570

Haematomma sp.

Epiphloeodal on forest trees. Rare. 571

PARMELIACEAE.

Parmelia sp.

Foliose lichen. Dominant on flat rock outcrops near top edge of mountain. 565

Parmelia sp.

Foliose lichen. Frequent on boulders near top edge of mountain. 566

Parmelia sp.

Foliose lichen. Frequent on boulders near top edge of mountain.

Parmelia sp.

Foliose lichen. Occasional on forest trees. 576

Parmelia sp.

Foliose lichen. Occasional on forest trees. 578

Parmelia sp.

Foliose lichen. Abundant on boulders just outside of Amatulu Forest. 583

USNEACEAE.

Ramalina sp.

Fruticose lichen. Occasional on shrubs on cliff face. Sub. No. 530

Ramalina sp.

Fruticose lichen. Frequent on forest and thornveld trees. 575

Usnea sp. Possibly *Usnea gonioides* Stirton.

Fruticose lichen. Frequent on shrubs on dry cliff face. 530

Usnea spp.

Fruticose on forest, thornveld and cliff scrub trees. —

CALOPLACEAE.

Caloplaca sp.

Epiphloeodal on forest trees. Locally frequent. 540

Caloplaca sp.

Epilithic on T.M.S. boulders and on cliff face. Abundant. 557

Caloplaca sp.

Epililithic on boulders along top edge of mountain. 558

Caloplaca sp.

Epilithic on boulders near top edge of mountain. 559

Caloplaca sp. 563

Caloplaca sp.

Epiphloeodal on forest trees. Frequent................ 581

TELOSCHISTACEAE.

Teloschistes validus Hillm.

Fruticose lichen. Occasional on forest and thornveld trees.. 545

BUELLIACEAE.

Buellia sp.

Epilithic on boulders near top edge of mountain. Occasional.. 543

Buellia sp.

Epilithic on boulders near top edge of mountain. Frequent.. 544

Buellia sp.

Epilithic lichen. Dominant on many boulders near top of mountain.. 562

Buellia sp.

Epiphloeodal on forest trees. Rare.................... 538

Rhinodina sp.

Epilithic on boulders near top edge of mountain. Occasional.. 556

PHYSCIACEAE.

Physcia sp.

Foliose lichen. Occasional on forest trees.............. 537

Anaptychia speciosa var. *esorediata* Wain.

Foliose lichen. Occasional on forest trees.............. 532

Anaptychia leucomelaena var. *multifida* Wain..

Fruticose lichen. Abundant on forest and thornveld trees.. 533.

Anaptychia sp.

Foliose lichen. Occasional on forest trees.............. 577

FAMILY.

Solenospora sp.

Epilithic on boulders near top edge of mountain......... 561

BRYOPHYTA.

SPHAGNALES.

SPHAGNACEAE.

Sphagnum truncatum Horns. emend. Garside
Abundant in stagnant vlei pools and frequent on moist soil. 281,708

Sphagnum capense Horns.
Forms cushions on moist cliff face..................... 605

PTERIDOPHYTA.

ORDER LYCOPODIALES.

LYCOPOCIACEAE.

Lycopodium cernuum L.
Abundant over main channel of vlei.................... 54

Lycopodium gnidioides L.f.
Locally frequent on trees receiving spray from waterfall in Amatulu Forest.................................. 53

Lycopodium sarcocaulon A. Br. et Welw. ex Kuhn
Frequent in drier parts of vlei.......................... 600,730

Lycopodium verticillatum L.f.
Locally frequent on trees receiving spray from waterfall in Amatulu Forest.................................. 57

ORDER SELAGINELLALES.

SELAGINELLACEAE.

Selaginella dregei (Presl) Hieron.
Abundant on dry rocks.............................. 540

Selaginella kraussiana (Kunze) A. Braun
Abundant on moist rock surfaces...................... 606

ORDER EQUISETALES.

EQUISETACEAE.

Equisetum ramosissimum Desf.
Frequent on banks of Umgeni River.................. —

ORDER OPHIOGLOSSALES.

OPHIGLOSSACEAE.

Ophioglossum reticulatum L.
Occasional in incipient sinkholes........................ 743

ORDER MARATTIALES.

MARATTIACEAE.

Marattia fraxinea Sm.
Locally frequent in forest............................ 59

ORDER FILICALES.

OSMUNDACEAE.

Todea barbara (L.) Moore
Occurs in clumps in forest............................ 49

SCHIZAEACEAE.

Anemia dregeana Kunze
Occasional in dryish parts of forest.................... 136

Mohria caffrorum (L.) Desv.
Frequent among boulders............................ 524

GLEICHENIACEAE.

Gleichenia polypodioides (L.) Sm.
Abundant on moist cliff face.......................... 43

Sticherus umbraculiferus (Kunze) Ching
Locally frequent in forest............................ 51

HYMENOPHYLLACEAE.

Trichomanes cupressoides Desv. sensu Copeland
Locally abundant on moist boulders.................... —

CYATHEACEAE.

Cyathea capensis (L.f.) Sm.
Forms clumps in moist parts of forest.................. 60

Cyathea dregei Kunze
Occasional along forest margin and frequent in sinkholes.. 62

POLYPODIACEAE.

Oleandroideae.

Oleandra distenta Kunze
Frequent on cliff face................................ 48,58,97

PTERIDOIDEAE.

Pteridium aquilinum (L.) Kuhn	Frequent in grassveld and along forest margin	525
Lonchitis stenochlamys Fée	Locally frequent in moist parts of forest	63
Histiopteris incisa (Thunb.) J. Sm.	Locally frequent in forest	135
Pteris quadriaurita Retz.	Frequent in forest	44

GYMNOGRAMMEOIDEAE.

Pityogramma argentea (Willd.) Domin	Solitary specimen on moist cliff face	112
Pityogramma austroamericana Domin	Locally frequent in moist parts of forest	96
Adiantum capillus-veneris L.	Occasional in forest and on moist cliff face	56
Adiantum raddianum Presl.	Occasional in forest	461
Cheilanthes multifida Sw.	Occasional on dry cliff face	95
Notholaena buchananii Bak.	Occasional on moist cliff face	113
Notholaena inaequalis Kunze	Rare in bouldery regions near top edge of mountain	2,46
Pellaea calomelanos (Sw.) Link	Frequent in dry bouldery places	114
Pellaea dura (Willd.) Bak.	Rare on moist cliff face	386
Pellaea viridis (Forsk.) Prantl	Abundant on dry cliff face and in bouldery regions	529

VITTARIOIDEAE.

Vittaria isoetifolia Bory	Locally frequent on moist cliff face	154

BLECHNOIDEAE.

Blechnum attenuatum (Sw.) Mett.	Occasional on moist cliff gace	168
Blechnum australe L.	Occasional on moist cliff face	42

Blechnum capense (L.) Schlecht.
Occasional at base of cliff in moist places.............. 357

Blechnum punctulatum Sw. var. *krebsii* (Kunze) Sim
Occasional along seepage lines in cliff face and frequent on forest floor.................................. 157

Blechnum tabulare (Thunb.) Kuhn
Abundant on S. facing sides of gullies on top of mountain 56

ASPLENIOIDEAE.

Asplenium anisophyllum Kunze
Occasional in forest................................ 115

Asplenium friesiorum C. Chr.
Frequent in moist parts of forest...................... 45, 169

Asplenium rutaefolium (Berg.) Kunze
Frequent in forest.................................. 526

Asplenium splendens Kunze
Occasional in forest................................ 47

DRYOPTERIDOIDEAE.

Dryopteris athamantica (Kunze) Kuntze
Abundant on moist talus slopes...................... 613

Dryopteris dentata (Forsk.) C. Chr.
Occasional in sinkholes............................ 64

Dryopteris gongylodes (Schk.) Kuntze
Occasional in reedswamp........................... 617

Dryopteris oligantha (Desv.) C. Chr.
Occasional in forest............................... 61

Dryopteris silvatica (Pappe et Rawson) C. Chr.
Rare in forest..................................... 50, 171

Dryopteris thelypteris (L.) Gray var. *squamigera* Schlecht.
Occasional in vlei................................. —

POLYPODIOIDEAE.

Polypodium ecklonii Kunze
Occasional in forest............................... 194

Polypodium schraderi Mett.
Frequent on talus slopes........................... 612

ELAPHOGLOSSOIDEAE.

Elaphoglossum angustatum (Schrad.) Hieron.
Locally frequent on cliff face........................ 55

ANGIOSPERMAE.

TYPHACEAE.

Typha latifolia L.
Abundant near rivers.................................. 479

GRAMINEAE.

Imperata cylindrica (L.) Beauv. var *africana* (Anderss.) C. E. Hubbard
Occasional in *Aristida-Sporobolus* Grassveld. 446

Eriochrysis pallida Munro
Frequent on hummocks in vlei.......................... 251, 729

Miscanthidium capense (Nees) Stapf
Abundant in and beside rivers.......................... 493

Ischaemum arcuatum (Nees) Stapf
Abundant on hummocks in vlei.......................... 422

Trachypogon spicatus (L.f.) Kuntze
Occasional in grassveld.............................. 330

Andropogon euconus Nees
Frequent in drier parts of vlei.......................... 282

Andropogon sp.
Rare near top edge of mountain........................ 83

Hypogynium schlechteri (Hack.) Pilger
Frequent in vlei...................................... 284, 713

Bothriochloa glabra (Roxb.) A. Camus
Frequent on islands in rivers.......................... 478

Sorghum sudanense (Piper) Stapf
Occasional on islands in rivers........................ 471

Cymbopogon marginatus (Steud.) Stapf
Dominant near rivers and streams and between cultivated fields.. 325

Hyparrhenia buchananii Stapf
Occasional along forest margin........................ 332

Hyparrhenia cymbaria (L). Stapf
Frequent near streams................................ 509

Hyparrhenia hirta (L.) Stapf
Occasional in grassveld.............................. 630

Monocymbium ceresiiforme (Nees) Stapf
Occasional in grassveld.............................. 252

Themeda triandra Forsk.	Occasional in grassveld	316
Paspalum commersonii Lam.	Rare in grassveld	219
Alloteropsis semialata (R. Br.) Hitch.	Occasional in grassveld and abundant along forest margin.	690
Panicum aequinerve Nees	Frequent in shallow vlei pools	421
Panicum glabrescens Steud.	Frequent near water	395, 477
Panicum natalense Hochst.	Occasional on walls of sinkholes	224
Echinochloa crus-pavonis (H.B.K.) Schult.	Occasional near rivers and streams	475
Digitaria adscendens (H.B.K.) Henrard	Rare on banks of Umgeni River	512
Digitaria longiflora (Retz.) Pers.	Occasional in bouldery places	314
Digitaria macroglossa Henrard	Occasional in streams	508
Rhynchelytrum setifolium (Stapf) Chiov.	Occasional in grassveld	262
Rhynchelytrum sp. (probably species nov.)	Frequent among boulders and on walls of sinkholes	40, 117
Oplismenus hirtellus (L.) Beauv. " forma robusta "	Abundant in forest	408
Oplismenus hirtellus (L.) Beauv. " forma simplex."	Abundant in forest	387
Setaria chevalieri Stapf ex Stapf et Hubbard	Frequent in forest	
Setaria sphacelata (Schumach.) Stapf et Hubb. ex M.B. Moss subsp. *pyropea* de Wit	Occasional along forest margin	462
Pennisetum natalense Stapf	Rare on banks of rivers	511
Beckeropsis uniseta (Nees) Stapf ex Robyns	Frequent between cultivated fields	455,457,616

Potamophila prehensilis (Nees) Benth.	Frequent climber in forest	458
Leersia hexandra Sw.	Abundant on banks of rivers	470
Ehrharta erecta Lam. var. *natalensis* Stapf	Occasional in forest	442
Aristida barbicollis Trin. et. Rupr.	Frequent in grassveld	594
Aristida junciformis Trin. et Rupr.	Dominant on top of mountain and at lower elevations	517
Sporobolus capensis (Willd.) Kunth	Frequently co-dominant with *Aristida junciformis*	441,445
Sporobolus centrifugus Nees	Occasional in grassveld	315
Trichopteryx dregeana Nees	Abundant on hummocks in vlei	420
Loudetia simplex (Nees) C. E. Hubbard	Occasional in grassveld	306
Danthonia macowanii Stapf	Frequently dominant on moist cliff face	623
Michrochloa caffra Nees	Locally frequent near top edge of mountain	736
Rendlia altera (Rendle) Chiov.	Frequent in grassveld	670
Harpechloa falx (L.) Kuntze	Occasional in grassveld	684
Chloris pycnothrix Trin.	Frequent in incipient sinkholes	439
Phragmites mauritianus Kunth	Abundant in and next to rivers	474
Eragrostis arenicola C. E. Hubbard	Frequent on banks of Umgeni River	619
Eragrostis capensis (Thunb.) Trin.	Frequent in grassveld	193
Eragrostis cilianensis (All.) Lutati	Occasional in cultivated fields	443
Eragrostis racemosa (Thunb.) Steud.	Frequent in grassveld	212

Agrostis natalensis Stapf
Frequent on hummocks in vlei........................ 250

Festuca scabra Vahl
Rare in grassveld................................... 725

CYPERACEAE.

Lipocarpha senegalensis (Lam.) Th. et H. Dur.
Abundant in vlei.................................... 498

Cyperus albostriatus Schrad.
Abundant in forest and occasional in sinkholes.......... 215

Cyperus compactus Lam.
Occasional in grassveld.............................. 76

Cyperus corymbosus Rottb.
Frequent in shallow vlei pools and in rivers............. 283,449

Cyperus difformis L.
Rare next to rivers.................................. 621

Cyperus latifolius Poir.
Dominant besides rivers and streams.................. 376

Pycreus ferrugineus C.B.Cl.
Occasional among boulders near top edge of mountain.. 320

Pycreus macranthus C.B.Cl.
Frequent in vlei..................................... 255

Pycreus mundtii Nees
Dominant along edge of certain stream pools........... 591

Pycreus polystachyus Beauv.
Occasional on moist cliff face........................ 298

Mariscus riparius Schrad.
Frequent in forest................................... 691

Mariscus sp..
Occasional in vlei................................... 256

Kyllinga elatior Kunth
Occasional in grassveld.............................. 375

Ficinia stolonifera Boeck.
Frequent in grassveld................................ 685,711

Ficinia sp..
Frequent on moist cliff faces......................... 598

Fuirena chlorocarpa Ridley
Abundant in shallow vlei pools........................ 267

Scirpus chlorostachys Levyns	
Abundant near rivers	499,590
Scirpus falsus C.B.Cl.	
Frequent in vlei	198
Scirpus fluitans L.	
Abundant in vlei pools	419
Scirpus paludicola Kunth forma *decipiens* (Nees) C.B.Cl.	
Occasional beside rivers	619
Scirpus prolifer Rottb.	
Abundant in vlei pools	205
Scirpus subprolifer Boeck.	
Occasional next to rivers	589
Scirpus tenuissimus Boeck.	
Occasional on sandy cliff ledges	432
Scirpus sp.	
Occasional on moist cliff face	155
Fimbristylis dichotoma (L.) Vahl	
Frequent on islands in rivers	472
Fimbristylis monostachya (L.) Hassk.	
Occasional in grassveld	720
Bulbostylis densa (Wall.) Handel—Mazetti	
Rare in moss mats	551
Bulbostylis boeckleriana (Schw.) Beetle	
Frequent in grassveld	705
Bulbostylis collina (Kunth) C.B.Cl.	
Occasional in grassveld	686
Bulbostylis humilis Kunth	
Frequent in moss mats and occasional in grassveld	254,620
Rhynchospora glauca Vahl	
Occasional in vlei	229
Scleria hirtellla Swartz var. *hirtella* Swartz	
Rare on hummocks in vlei	249
Schoenoxiphium caricoides C.B.Cl.	
Occasional in grassveld and frequent in vlei	696
Carex spicato-paniculata C.B.Cl.	
Occasional on moist cliff face and in sinkholes	303

PALMAE.		
Phoenix reclinata Jacq.	Occasional in forest and scrub	491
ARACEAE.		
Zantedeschia albomaculata Baill.	Occasional in incipent sinkholes	326
XYRIDACEAE.		
Xyris sp.	Frequent in hummocks on vleis	204
COMMELINACEAE.		
Aneilema aequinoctiale Kunth	Frequent in forest	296
Aneilema dregeanum Kunth	Frequent in forest	246
Cyanotis nodiflora Kunth	Frequent as chasmophyte	99
JUNCACEAE.		
Juncus lomatophyllus Spreng.	Dominant over large area of vlei	206
Juncus sp. (Probably *J. exertus* Buchen.)	Occasional in vlei	207
LILIACEAE.		
Bulbine natalensis Bak.	Occasional on cliff face	675
Anthericum sp.	Frequent in grassveld	180
Eriospermum sp.	Frequent in grassveld	724
Chlorophytum sp.	Locally frequent on exposed boulders in Umgeni River	592
Aloe arborescens Mill.	Occasional on cliff face	—
Aloe candelabrum Berger	Abundant in Thornveld	—
Agapanthus umbellatus L'Hérit.	Occasional on moist cliff face	—

Tulbaghia acutiloba Harv.
Abundant in grassveld.................................. 178

Drimia sp.
Occasional in sinkholes.................................. 199

Scilla natalensis Planch.
Occasional on cliff face.................................. 185

Scilla ovatifolia Bak.
Frequent in grassveld.................................. 184

Drimiopsis maculata Lindl.
Locally frequent on boulders in stream.................. 693

Dracaena hookeriana K. Koch
Frequent in forest.................................. —

Asparagus sp.
Abundant on talus slopes.................................. 389

Behnia reticulata F. Didrichs
Occasional in forest.................................. 607

AMARYLLIDACEAE.

Haemanthus mackenii Bak.
Occasional in forest.................................. 506

Haemanthus natalensis Pappe
Abundant on talus slopes and occasional in sinkholes.... 182

Clivia gardenii Hook.
Frequent in bouldery parts of forest.................. 466

Clivia miniata Regel
Frequent in bouldery parts of forest.................. 624

Anoiganthus luteus Bak.
Occasional in grassveld.................................. 177

Apodolirion buchananii Bak.
Occasional in grassveld.................................. 576

Hypoxis gerrardii Bak.
Occasional in grassveld.................................. 225

VELLOZIACEAE.

Vellozia talbotii Balf.
Frequent on moist cliff face.......................... 243

IRIDACEAE.

Aristea woodii N. E. Br.
Frequent in grassveld.................................. 216

Dierama sp.	
Frequent in grassveld	712
Gladiolus cruentus T. Moore	
Occasional on moist cliff face	41,515
Lapeyrousia cruenta (Lindl.) Bak.	
Frequent among boulders	259
Watsonia densiflora Bak.	
Locally frequent in gullies on top of mountain	78
MUSACEAE.	
Strelitzia nicolai Regel et Kern	
Locally frequent in clumps in forest	—
ORCHIDACEAE.	
Stenoglottis fimbriata Lindl.	
Frequent in forest	391
Stenoglottis sp.	
Frequent on moist cliff face	244
Satyrium sp.	
Occasional in vlei	234
Schizochilus zeyheri Sond.	
Occasional along edge of vlei	232
Disa polygonoides Lindl.	
Frequent on hummocks in vlei	—
Eulophia leontoglossa Reichb. f.	
Frequent in grassveld	709
Mystacidium capense (L.f.) Schltr.	
Frequent in forest and treeveld	425
PIPERACEAE.	
Piper capense L.	
Occasional in forest	435
Peperomia reflexa A. Dietr.	
Frequent in moist parts of forest	385
SALICACEAE.	
Salix woodii Seem.	
Occasional in and next to rivers	510
MYRICACEAE.	
Myrica conifera Burm. f.	
Abundant on hummocks in vlei	374

ULMACEAE.

Celtis africana Burm. f.
Occasional in forest.................................. 380

Trema guineensis (Schum.) Ficalho
Occasional in forest.................................. 218

Chaetacme aristata Planch.
Rare in forest.. 379

MORACEAE.

Ficus capensis Thunb.
Frequent in forest.................................... 456

Ficus craterostoma Warb. ex Mildbrd. et Burret
Occasional on cliff face.............................. 399

Ficus ingens Miq.
Frequent on cliff face................................ 107

Ficus natalensis Hochst.
Frequent in forest and on talus slopes................ 519

Ficus sonderi Miq.
Occasional on cliff face and on top of mountain near edge. 91

URTICACEAE.

Urera tenax N. E. Br.
Frequent on talus slopes.............................. 291,437, 682

Fleurya mitis E. Mey. ex Wedd.
Occasional in forest.................................. 405

Pouzolzia parasitica Schweinf.
Occasional in forest.................................. 394

PROTEACEAE.

Faurea saligna Harv.
Dominant on certain moist slopes...................... 367

Protea simplex Phillips
Occasional along top edge of mountain................. —

LORANTHACEAE.

Loranthus dregei Eckl. et Zeyh.
Occasional in Thornveld............................... 160

Viscum sp.
Abundant in Thornveld................................. 497

SANTALACEAE.

Osyris compressa (Berg.) A.DC.

Occasional on dry cliff face.......................... 152

OLACACEAE.

Ximenia americana L.

Occasional on dry cliff face.......................... 292

POLYGONACEAE.

Polygonum salicifolium Brouss.

Abundant on banks of rivers.......................... 406

Oxygonum dregeanum Meisn. var. *dregeanum* Meisn.

Rare in grassveld.................................. 732

AMARANTACEAE.

Celosia trigyna L.

Occasional in forest and sinkholes.................... 143

Cyathula cylindrica Moq.

Frequent on talus slopes............................. 131

Cyathula globulifera Moq.

Occasional in forest and sinkholes.................... 132

PHYTOLACCACEAE.

Psammotropha myriantha Sond.

Frequent in grassveld and occasional as chasmophyte.... 239

Phytolacca americana L.

Occasional in field layer of forest.................... 412

Phytolacca dodecandra L'Hérit.

Occasional in forest and sinkholes.................... 81

AIZOACEAE.

Aptenia cordifolia (L.f.) Schwantes

Frequent on dry cliff face............................ 410

Erepsis sp.

Frequent on dry cliff face............................ 434

CARYOPHYLLACEAE.

Drymaria cordata Willd. ex Roem. et Schult.

Frequent in forest.................................. 436

Pollichia campestris Ait.

Occasional under cliff ledges.......................... 161

Silene burchellii Otth

Occasional in grassveld................................ 197

RANUNCULACEAE.

Clematis brachiata Thunb.

Frequent in thornveld and on talus slopes............... 428

MENISPERMACEAE.

Stephania abyssinica (Dill. et Rich.) Walp. var. *tomentella* (Oliv.) Diels

Occasional in sinkholes................................ 80

ANONACEAE.

Popowia caffra (Sond.) Hook.f. et Thomas

Frequent in forest..................................... 383

MONIMIACEAE.

Xymalos monospora (Harv.) Baill

Occasional in forest and in sinkholes.................. 626

LAURACEAE.

Cassytha filiformis L.

Frequent in forest..................................... 336

Cryptocarya woodii Engl.

Frequent in forest..................................... 105

CAPPARIDACEAE.

Capparis tomentosa Lam.

Occasional along forest margin......................... 343

Cadaba natalensis Sond.

Occasional in forest................................... 398

Maerua racemulosa (A. DC.) Gilg et Benedict

Occasional in dry parts of forest...................... 118

DROSERACEAE.

Drosera burkeana Planch.

Frequent on moist cliff face and in vlei............... 278

PODOSTEMONACEAE.

Sphaerothylax algiformis Bisch.

Locally frequent on boulders in Umgeni River........... 490

HYDROSTACHYACEAE.

Hydrostachys natalensis Wedd.

Locally frequent in Umgeni river....................... 489

CRASSULACEAE.

Cotyledon sp.	Occasional on dry cliff face	602
Kalanchoe sp. c.f. *K. hirta* Harv.	Occasional on dry cliff face	447
Crassula expansa Ait.	Frequent in forest	430
Crassula heterotricha Schinz	Occasional among boulders and on cliff face	678
Crassula rosularis Haw.	Locally frequent on dry cliff face	167
Crassula vaginata Eckl. et Zeyh.	Occasional in grassveld and among boulders	273
Crassula sp.	Occasional among boulders near top edge of mountain	312
Crassula sp.	Occasional among boulders in forest	444

PITTOSPORACEAE.

Pittosporum viridiflorum Sims	Occasional in forest	258

CUNONIACEAE.

Cunonia capensis L.	Occasional in forest	—

ROSACEAE.

Cliffortia serpyllifolia Cham. et Schlecht.	Abundant in vlei	279, 502
Cliffortia strobilifera Murr.	Rare on banks of Umsindusi River	481
Pygeum africanum Hook. f.	Locally frequent in forest	610

CONNARACEAE.

Cnestis natalensis Planch. et Sond.	Occasional in forest	85, 677

LEGUMINOSAE.

Acacia nilotica (L.) Del.	One of dominants in thornveld	468

Acacia ataxacantha DC. ex Taub. Frequent in thornveld and along forest margin	467
Acacia caffra (Thunb.) Willd. Occasional in Thornveld	458
Acacia woodii Burtt-Davy Occasional in thornveld	518
Acacia karroo Hayne Frequent in Thornveld	486
Dicrostachys glomerata (Forsk.) Chiov. Occasional in Thornveld	487
Entada spicata (E. Mey.) Druce Occasional in forest	473
Schotia brachypetala Sond. Occasional in Thornveld	297
Cassia mimosoides L. Occasional in grassveld	73, 230
Caesalpinia decapetala (Roth) Alston Frequent as cultivated hedge around kraals	—
Calpurnia subdecandra (L' Hérit.) Schweick. Frequent in Thornveld	295, 347
Baphia racemosa Afzel. Occasional along rivers	494, 703
Crotalaria capensis Jacq. Occasional in open parts of forest	411
Crotalaria lanceolata E. Mey. Occasional in grassveld	98
Argyrolobium tomentosum (Andr.) Druce Occasional in forest	123
Argyrolobium rupestre Walp. Occasional in grassveld	741
Indigofera velutina E. Mey. Frequent in grassveld	175
Psoralea pinnata L. Occasional on moist cliff face and in gullies on top of mountain	87
Tephrosia diffusa Harv. Occasional among boulders	738
Sesbania sp. Frequent next to rivers and streams	495

Aeschynomene micrantha DC.
Occasional in grassveld.................................. 733

Zornia capensis Pers.
Frequent in grassveld.................................. 218

Desmodium repandum (Vahl) DC.
Frequent in forest.................................. 144

Pseudarthria hookeri Wight et Arn.
Frequent along margin of forest.................................. 74

Alysicarpus rugosus (Willd.) DC.
Frequent in grassveld.................................. 731

Dalbergia armata E. Mey.
Occasional in Thornveld and in forest.................................. 492

Dalbergia obovata E. Mey.
Frequent in forest.................................. 338

Glycine javanica L.
Occasional in forest.................................. 484

Erythrina caffra Thunb.
Occasional in Thornveld.................................. 304

Erythrina latissima E. Mey.
Occasional in Thornveld.................................. —

Eriosema kraussiana Meisn.
Occasional in grassveld.................................. 715

GERANIACEE.

Pelargonium grossularioides (L.) Ait.
Occasional on moist cliff face.................................. 460

ERYTHROXYLACEAE.

Erythroxylum pictum E. Mey.
Occasional in forest.................................. 84

RUTACEAE.

Fagara capensis Thunb.
Occasional in forest.................................. 129, 548

Clausena anisata (Willd.) Hook. f.
Occasional in forest.................................. 345

BURSERACEAE.

Commiphora caryaefolia Oliv.
Occasional in forest.................................. —

Commiphora harveyi Engl.
Frequent in Thornveld and occasional in forest.......... 381

MELIACEAE.

Turraea floribunda Hochst.
Occasional in forest.................................. 404

Ekebergia meyeri Presl.
Occasional in forest.................................. 681

Trichilia pterophylla C.DC.
Occasional in forest.................................. 104

Trichilia roka (Forsk.) Chiov.
Frequent in forest.................................. 549

MALPHIGIACEAE.

Acridocarpus natalitius A. Juss.
Frequent in forest.................................. 241

POLYGALACEAE.

Polygala gracilenta Burtt-Davy
Occasional in grassveld.............................. 272, 740

Polygala ohlendorfiana Eckl. et Zeyh.
Occasional in grassveld.............................. 721

Polygala serpentaria Eckl. et Zeyh.
Occasional along forest margin....................... 639

Muraltia lancifolia Harv.
Occasional in grassveld.............................. 228, 659

EUPHORBIACEAE.

Phyllanthus meyerianus Muell. Arg.
Occasional among boulders........................... 719

Drypetes arguta (Muell. Arg.) Hutch.
Occasional in forest.................................. 158

Drypetes natalensis (Harv.) Hutch.
Occasional in forest.................................. 311

Antidesma venosum E. Mey. ex Tul.
Rare along margin of forest.......................... 327

Bridelia micrantha Baill.
Frequent in forest.................................. 388

Croton sylvaticus Hochst. apud Krauss
Dominant in one type of short forest................. 440

Macaranga capensis Sim	Dominant in forest at head of streams	109
Acalypha glabrata Thunb.	Occasional in forest	362
Clutia pulchella L.	Occasional near top edge of mountain and in grassveld	75
Spirostachys africana Sond.	Occasional in thornveld	368
Sapium ellipticum (Hochst.) Pax	Occasionally dominant at head of streams	270
Euphorbia epicyparissias E. Mey.	Occasional in grassveld	337
Euphorbia ingens E. Mey.	Frequent in thornveld	—
Euphorbia kraussiana Bernh.	Occasional in forest	337
Euphorbia tirucalli L.	One of dominants in Thornveld	516

ANACARDIACEAE.

Sclerocarya caffra Sond.	Dominant on slope near Umgeni river	297, 695
Harpephyllum caffrum Bernh. ex Krauss	Occasional in forest	341
Protorhus longifolia (Bernh.) Engl.	Locally frequent in forest	130, 698
Smodingium argutum E. Mey.	Occasional in thornveld	402
Heeria paniculosa (Sond.) Kuntze	Rare in thornveld	476
Rhus dentata Thunb.	Locally frequent in incipient sinkholes	674
Rhus legatii Schonl.	Occasional in forest	371, 694
Rhus lucida L.	Occasional in thornveld	488
Rhus macowanii Schonl.	Occasional along forest margin	305

CELASTRACEAE.

Gymnosporia buxifolia (L.) Szyszl.	Frequent in thornveld	365, 585
Gymnosporia peduncularis (E. Mey. ex Sond.) Sim	Occasional in forest	615
Pterocelastrus echinatus N.E. Br.	One of dominants on dry cliff face	501

ICACINACEAE.

Apodytes dimidiata E. Mey. ex Benth.	Occasional in forest	348

SAPINDACEAE.

Allophylus dregeanus (Sond.) de Winter	Frequent in forest	503
Allophylus melanocarpus (Sond.) Radlk.	Occasional in forest	—
Allophylus natalensis (Sond.) de Winter	Rare in forest	127
Hippobromus pauciflorus (L.f.) Radlk.	Frequent in thornveld	366

MELIANTHACEAE.

Bersama tysoniana Oliv.	Occasional in forest	164, 601, 688
Greyia sutherlandii Hook. et Harv.	Occasional on dry cliff ledges	629

BALSAMINACEAE.

Impatiens duthieae L. Bolus	Abundant in forest	247

RHAMNACEAE.

Ziziphus mucronata Willd.	Occasional in Thornveld	302
Scutia myrtina (Burm.f.) Kurz	Occasional in Thornveld forest	378
Helinus integrifolius (Lam.) Kuntze	Frequent in Thornveld	377

HETEROPYXIDACEAE.

Heteropyxis natalensis Harv.	Frequent in Thornveld	293

VITACEAE.

Rhoicissus capensis (Burm.f.) Planch.
Abundant in forest.................................. 339, 465

Rhoicissus cuneifolia (Eckl. et Zeyh.) Planch.
Frequent in forest and sinkholes........................ 263

Rhoicissus digitata (L.f.) Gilg et Brandt
Occasional in forest.................................. 514

Rhoicissus rhomboidea (E. Mey. ex Harv.) Planch.
Rare in forest....................................... 643

Cissus fragilis E. Mey.
Occasional in forest.................................. 359

Cissus hypoleuca Harv.
Abundant in forest.................................. 416

Cissus natalitia (Szyszl.) L. E. Codd
Frequent among boulders............................ 263

TILIACEAE.

Grewia occidentalis L.
Occasional near rivers............................... 496

Triumfetta pilosa Roth. var. *tomentosa* Szyszl.
Occasional in disturbed parts of forest.................. 100

Triumfetta rhomboidea Jacq.
Occasional in open parts of forest...................... 101

Abutilon indicum Sw.
Occasional in open parts of forest...................... 433

Pavonia burchellii (DC.) R. A. Dyer
Occasional in dry parts of forest....................... 433

Pavonia columella Cav.
Frequent in open parts of forest....................... 407

Hibiscus calyphyllus Cav.
Rare in forest....................................... 372

Hibiscus gossypinus Thunb.
Occasional along forest margin........................ 266

Hibiscus pedunculatus (L.f.) Cav.
Frequent in dry patts of forest......................... 89

Hibiscus physaloides Guill. et Perr.
Rare at base of cliff.................................. 286

STERCULIACEAE.

Dombeya natalensis Sond.	Occasional in forest	106
Dombeya rotundifolia (Hochst.) Harv.	Occasional in thornveld	637

OCHNACEAE.

Ochna arborea Burch.	Frequent in forest	126, 608
Ochna atropurpurea DC.	Fairly frequent in thornveld	—

GUTTIFERAE

Hypericum lalandii Choisy	Frequent in vlei	236

FLACOURTIACEAE

Rawsonia lucida Harv. et Sond.	Occasional in forest	170, 687
Kiggelaria africana L.	Rare in forest	352, 426
Scolopia ecklonii (Nees apud Eckl. et Zeyh.) Harv.	Occasional in forest	640
Scolopia gerrardii Harv.	Occasional along margin of forest	285
Gerrardina foliosa Oliv.	Occasional in forest	146
Trimeria grandifolia (Hochst.) Warb.	Occasional in forest	350

PASSIFLORACEAE.

Passiflora sp.	Frequent in forest, treeveld and on talus slopes	310

BEGONIACEAE.

Begonia natalensis Hook.	Abundant in forest	321

THYMELAEACEAE.

Peddiea africana Harv.	Occasional in forest	595

Lasiosiphon anthylloides Meisn.
Occasional in grassveld.................................. 140

Lasiosiphon kraussianus Meisn.
Frequent in grassveld.................................. 187

Arthrosolen calocephalus C. A. Mey.
Occasional in grassveld.................................. 141

Passerina filiformis L.
Dominant on moist cliff face and co-dominant with *Euryops tenuissimus* on top of mountain near edge............ 238

LYTHRACEAE.

Nesaea salicifolia H. B. K.
Locally frequent in incipient sinkholes.................. 438

RHIZOPHORACEAE.

Cassipourea gerrardii Alston
Occasional in forest.................................. 120

Cassipourea gummiflua Tul. var. *verticillata* (N. E. Br.) J. Lewis
Frequent in forest.................................. 121

COMBRETACEAE.

Combretum holosericeum Sond.
Dominant in one type of woodland and occasional in thornveld.. 586

Combretum kraussii Hochst.
Frequent in forest.................................. 203

MYRTACEAE.

Eugenia albanensis Sond.
Frequent in grassveld.................................. 201

Eugenia natalitia Sond.
Locally frequent in forest.......................... 599

Syzygium cordatum Hochst. ex Harv. et Sond.
Frequent in forest.................................. 301, 680

Syzygium gerrardii (Harv.) Hochst.
Dominant along top edge of cleft in mountain.......... 641

MELASTOMACEAE.

Dissotis canescens (E. Mey. ex Graham) Hook.f.
Frequent in vlei.................................. 237

ONAGRACEAE.

Jussieua diffusa Forsk.
Locally frequent in river pools........................ 587

Jussieua suffruticosa L.
Frequent on islands in rivers.......................... 469

Epilobium hirsutum L.
Occasional near streams............................... 454

HALORRHAGIDACEAE.

Laurembergia repens Berg.
Abundant in shallow vlei pools........................ 231

ARALIACEAE.

Cussonia spicata Thunb.
Frequent in Thornveld................................ 520

Seemannaralia gerrardii (Seem.) Viguier
Dominant on dry talus slopes......................... —

UMBELLIFERAE.

Hydrocotyle americana L.
Locally frequent on moist cliff face and in shallow pools.. 550

Centella coriacea Nannfd.
Frequent in vlei..................................... 276

Alepidea longifolia E. Mey.
Occasional in grassveld.............................. 139

Heteromorpha arborescens (Thunb.) Cham. et Schlecht.
Rare along forest margin............................. 346

ERICACEAE.

Erica aspalathifolia Bolus
Locally frequent on moist cliff face.................... 66, 150

Erica caffra L.
Occasional on moist cliff face........................ 165, 635

Erica cubica L.
Occasional on moist cliff face........................ 65, 151

Philippia evansii N. E. Br.
Occasional on moist cliff face........................ 604

MYRSINACEAE

Maesa alnifolia Harv.
Locally frequent in incipient sinkholes................ 672

Maesa lanceolata Forsk.
Frequent along forest margin and in sinkholes.......... 94

Rapanea melanophloeos (L.) Mez
Occasional in forest.................................. 124, 597

SAPOTACEAE.

Chrysophyllum natalense Sond.
Frequent in forest.................................. 308

EBENACEAE

Royena pubescens Willd.
Ocasional in forest.................................. 627

Euclea multiflora Hiern
Occasional in Thornveld............................ 369

OLEACEAE.

Schrebera alata (Hochst.) Welw.
Co-dominant with *Pterocelastrus echinatus* on dry cliff face 210

Olea capensis L. subsp. *enervis* (Harv.) Verdoorn
Rare in forest.. 317

SALVADORACEAE

Azima tetracantha Lam.
Occasional in dry parts of forest...................... 122

LOGANIACEAE

Strychnos spinosa Lam.
Occasional in forest.................................. 344

Nuxia floribunda Benth.
Occasional in forest.................................. 353

Buddleia dysophylla (Benth.) Phillips
Occasional in forest.................................. 163

Buddleia pulchella N.E.Br.
Occasional in forest and along margin................. 196, 596

Buddleia salicifolia Jacq.
Frequent in Thornveld.............................. 364

GENTIANACEAE

Sebaea sedoides Gilg
Frequent in grassveld.............................. 6

Exochaenium grande Griseb.
Occasional in grassveld............................ 145

Chironia purpurascens Benth.	
Occasional in vlei	728
APOCYNACEAE.	
Acokanthera venenata (Burm. f.) G. Don	
Occasional along forest margin	506
Carissa bispinosa (L.) Desf.	
Frequent in forest	448
Rauvolfia caffra Sond.	
Frequent in forest	679
Oncinotis inandensis Wood et Evans	
Occasional in forest	309, 683
ASCLEPIADACEAE.	
Cryptolepis oblongifolia (Meisn.) Schltr.	
Rare in grassveld	260
Schizoglossum woodii Schltr.	
Occasional in grassveld	722
Asclepias affinis Schltr.	
Occasional in grassveld	15, 275
Brachystelma franksiae N.E. Br.	
Rare in grassveld	209
Riocreuxia torulosa Decne.	
Occasional in forest	245
CONVOLVULACEAE.	
Ipomoea ficifolia Lindl.	
Frequent in forest	409
Ipomoea simplex Thunb.	
Occasional in grassveld	382, 710
BORRAGINACEAE.	
Ehretia rigida (Thunb.) Druce	
Frequent in Thornveld	125
VERBENACEAE.	
Clerodendrum glabrum E. Mey.	
Occasional in forest	396
LABIATAE	
Teucrium riparium Hochst.	
Occasional in sinkholes and cultivated fields	214

Leonotis dubia E. Mey.
Locally frequent in open parts of forest................ 403

Leonotis leonurus (L.) Ait.
Frequent along forest margin......................... 700

Stachys tubulosa MacOwan
Frequent in forest.................................. 248

Plectranthus ciliatus E. Mey.
Abundant in forest................................. 329

Plectranthus sp. aff. *P. strigosus* Benth.
Locally frequent in forest............................ 504

Plectranthus sp.
Frequent in open parts of forest...................... 102

Aeolanthus parvifolius Benth.
Frequent among boulders........................... 552

Iboza riparia N.E.Br.
Frequent on talus slopes and in open parts of forest..... 156

Ocimum suave Willd.
Occasional along forest margin....................... 451

Becium obovatum N. E. Br.
Occasional in grassveld.............................. 716

SOLANACEAE.

Lycium acutifolium E. Mey.
Occasional under cliff ledges......................... 351

Solanum auriculatum Ait.
Abundant in disturbed parts of forest and in sinkholes... —

Solanum giganteum Jacq.
Occasional in open parts of forest..................... 289,401

Cestrum laevigatum Schlecht.
Occasional in forest................................. 300, 584

SCROPHULARIACEAE.

Nemesia chamaedrifolia Vent.
Frequent in incipient sinkholes....................... 176

Diclis reptans Benth.
Occasional in grassveld............................. 723

Halleria lucida L.
Frequent in forest.................................. 108,93

Anastrabe integerrima E. Mey.
Occasional in sinkholes and forest..................... 93

Zaluzianskya maritima Walp.	
Occasional in grassveld	86
Ilysanthes sp.	
Occasional in moss mats	739
Selago natalensis Rolfe	
Frequent in grassveld	382
Selago sp.	
Occasional among boulders	313
Cycnium adonense E. Mey.	
Occasional in grassveld	208
Rhamphicarpa tubulosa (L.f.) Benth.	
Occasional on banks of rivers	593
Striga bilabiata (Thunb.) Kuntze	
Frequent in grassveld	257
Harveya speciosa Bernh.	
Occasional in forest	299

GESNERACEAE.

Streptocarpus gardenii Hook.f.	
Frequent in forest	227
Streptocarpus wendlandii Sprenger	
Rare in forest	370

LENTIBULARIACEAE.

Utricularia livida E. Mey.	
Frequent on moist cliff face	614,726

ACANTHACEAE.

Thunbergia natalensis Hook.	
Occasional among boulders	714
Chaetacanthus setiger (Pers.) Lindl.	
Occasional in grassveld	226
Barleria obtusa Nees	
Frequent in thornveld	487
Peristrope natalensis T. Anders	
Occasional in thornveld	—
Hypoestes antennifera S. Moore	
Frequent in forest	90
Hypoestes triflora Roem. et Schult.	
Frequent in forest	400

Hypoestes verticillaris (L.f.) R. Br.
Occasional in forest.................................... 393

Rhinacanthus communis Nees
Occasional in forest.................................... 373

Ruttya ovata Harv.
Occasional in forest.................................... 363

Justicia campylostemon T. Anders.
Abundant in forest...................................... 290

Duvernoia adhatodioides E. Mey.
Dominant on moist talus slopes.......................... 335

RUBIACEAE.

Conostomium natalense (Hochst.) Brem.
Occasional in forest.................................... 390

Aganthisanthemum chlorophyllum (Hochst.) Brem.
Frequent in moist parts of grassveld and in vlei......... 253

Burchellia bubalina (L.f.) Sims
Occasional in forest and sinkholes...................... 202

Randia rudis E. Mey.
Abundant in thornveld................................... 521

Oxyanthus gerrardii Sond.
Frequent in forest...................................... 103

Tricalysia lanceolata (Sond.) Burtt Davy
Occasional in forest and thornveld...................... 358

Alberta magna E. Mey.
Occasional in forest.................................... 110, 153

Pentanisia prunellioides (Klotzsch ex Eckl. et Zeyh.) Walp
Occasional in grassveld and sinkholes................... 340

Vangueria infausta Burch.
Occasional in Thornveld and along margin of forest..... 268

Canthium ciliatum (Klotzsch) Kuntze
Rare along forest margin................................ 414

Canthium gueinzii Sond.
Frequent in forest...................................... —

Canthium inerme (L.f.) Kuntze
Occasional along forest margin and in sinkholes......... 522

Canthium mundtianum Cham. et Schlecht.
Rare on dry cliff face................................... 288

Pachystigma latifolium Sond.
Occasional between cultivated fields.................... 307

Pavetta bowkeri Harv.
Frequent in forest.................................. 242

Pavetta sp. probably *P. delagoensis* Brem.
Occasional in forest................................ 271

Grumilea capensis Sond.
Occasional in forest................................ 166

Galopina aspera (Eckl. et Zeyh.) Sond.
Occasional in sinkholes and among boulders........... 72

Galopina circaeoides Thunb.
Frequent in forest.................................. 328

Anthospermum lanceolatum Thunb.
Occasional on moist cliff face....................... 323

Anthospermum sp.
Occasional among boulders........................... 77

Anthospermum sp.
Frequent in *Passerina-Euryops* Scrub.................. 603

Borreria natalensis (Hochst.) K. Schum. ex S. Moore
Occasional in grassveld.............................. 221

Rubia cordifolia L.
Rare in forest...................................... 333

CUCURBITACEAE.

Melothria membranifolia Cogn.
Occasional in forest................................ 133

Coccinia sp.
Frequent in sinkholes............................... 213, 742

CAMPANULACEAE.

Wahlenbergia grandiflora Brehmer
Locally frequent in grassveld......................... 265, 342

Wahlenbergia oppositifolia A. DC.
Occasional in grassveld.............................. 734

Lobelia decipiens Sond.
Frequent in grassveld............................... 523

Lobelia erinus L.
Occasional in grassveld.............................. 415

Lobelia nuda Hemsl. Frequent in vlei	280
Lobelia pteropoda (Presl) A. DC. Abundant in forest	217
Monopsis stellaroides (Presl) var. *stellaroides* E. Wimm. Ocasional on moilst cliff face	424

COMPOSITAE.

Vernonia angulifolia DC. Abundant on talus slopes	134
Vernonia corymbosa Less. Occasional along forest margin	418
Vernonia monocephala Harv. Occasional among boulders near top edge of mountain	223, 735
Vernonia shirensis Oliv. et Hiern Occasional along forest margin	431
Ageratum conyzoides L. Common ruderal	137
Mikania cordata (Burm.f.) Robinson Frequent in forest	172
Cassinia phylicaefolia (DC.) J. M. Wood Occasional in grassveld	427
Helichrysum adenocarpum DC. Frequent in grassveld	79
Helichrysum appendiculatum (L.f.) Less. Occasional in grassveld	354
Helichrysum aureonitens Sch. Bip. Locally frequent in moist patches of grassveld and in vlei	275
Helichrysum caespititium Sond. Occasional in grassveld	179
Helichrysum fulgidum (L.) Willd. Frequent in grassveld	200, 671
Helichrysum glomeratum Klatt Occasional in vlei	423
Helichrysum woodii N.E.Br. Occasional on dry cliff face	3

Helichrysum sp. (heads immature)
Occasional in vlei 361

Stoebe vulgaris Levyns
Frequent in vlei and on moist cliff face 181

Athanasia acerosa D. Dietr.
Frequent along forest margin 628

Pentzia sp. (matches Galpin 10297)
Locally frequent in grassveld 188, 673

Matricaria nigellaefolia DC.
Frequent on river banks 702

Senecio brachypodus DC.
Occasional in forest 463

Senecio macrocephalus DC.
Occasional in grassveld 174

Senecio macroglossus DC.
Occasional in forest and frequent in Thornveld 459

Senecio pleistocephalus S. Moore
Occasional in forest 482

Senecio rhyncholaenus DC.
Frequent among boulders 261

Senecio tamoides DC.
Occasional in forest 138

Euryops tenuissimus (L.f.) Less.
Co-dominant with *Passerina filiformis* along top edge of mountain 464

Euryops laxus (Harv.) Burtt-Davy
Occasional in grassveld 186

Ursinia foeniculacea Poir.
Occasional in grassveld 632

Gazania sp. (material inadequate for determination).
Frequent in grassveld 631

Berkheya rhapontica (DC.) Hutch. et Burtt Davy
Frequent in vlei 277

Gerbera natalensis Sch. Bip.
Abundant in grassveld 162

APPENDIX B.

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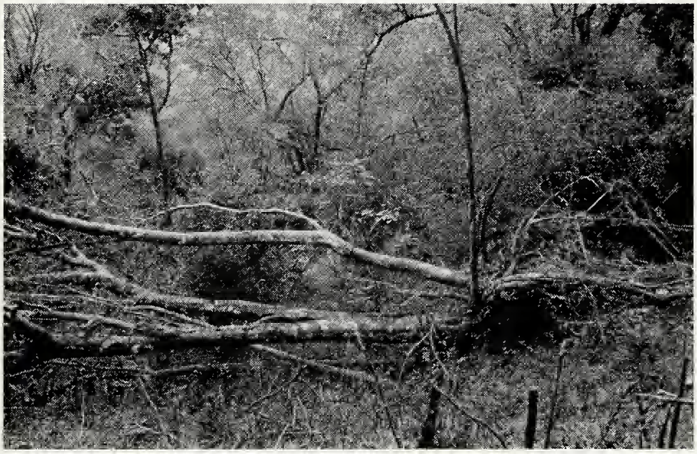


Plate 1.—Windthrown *Combretum kraussii*. Windthrown trees are usually found in parts of Kloof Forest, where the soil is shallow and moist. A consociation of *Combretum kraussii* is in the background. *Photo: A. W. Bayer.*

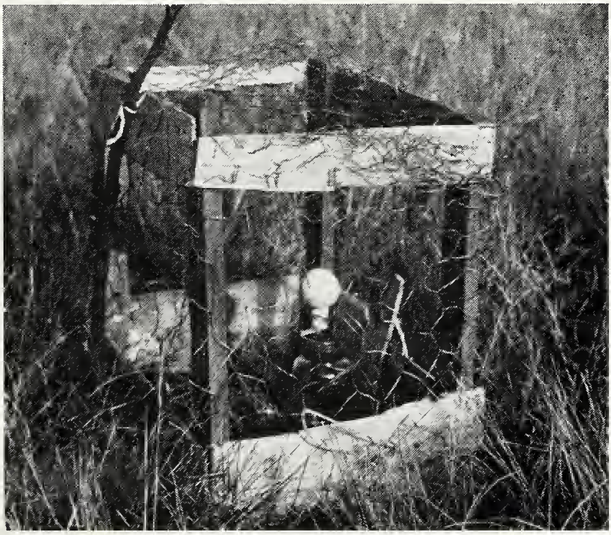


Plate 2.—The evaporimeter in the Grassveld on the summit of the mountain. *Photo:* D. N. Watton.

PLATE 3.—A view of portion of the Vlei. For details of its floristic composition see Fig. 4, a map of the same area. *Photo: D. N. Watton.*

PLATE 4.—*Hydrostachys natalensis* Consocies. This aquatic is attached to the ridges of small rapids in the Umgeni River. The erect shoots are inflorescences. *Photo: D. N. Watton.*

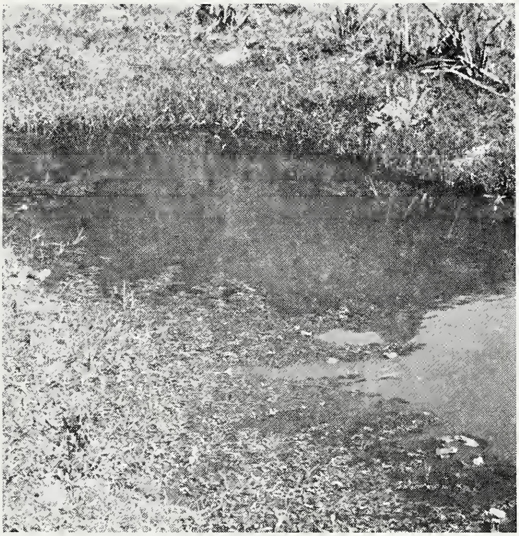


Plate 5.—Zonation in a side-pool of the Umgeni River. In the centre is the submerged aquatic *Nitella* sp. (588). Towards the periphery of the pool is *Jussieua diffusa*, a floating aquatic. *Pycreus mundtii* can be seen encroaching over the floating aquatic zone and *Cyperus latifolius* is in the background. *Photo: D. N. Watton.*

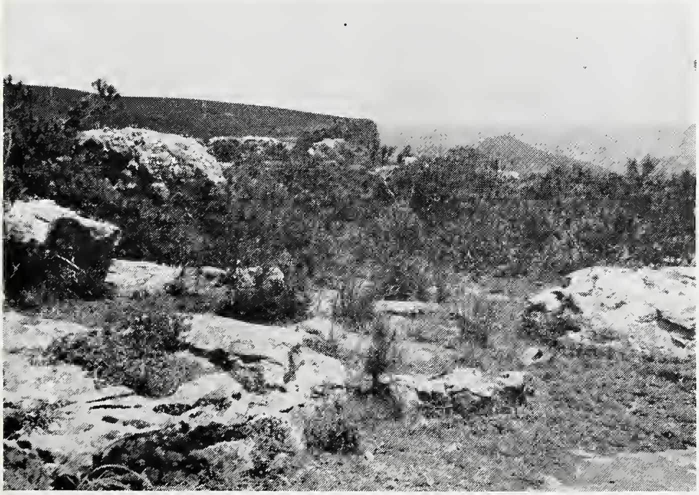


Plate 6.—*Euryops tenuissimus.* This composite is one of the dominants in the scrub on top of the mountain near the edge. In the foreground are extensive moss mats. *Photo: D. N. Watton.*

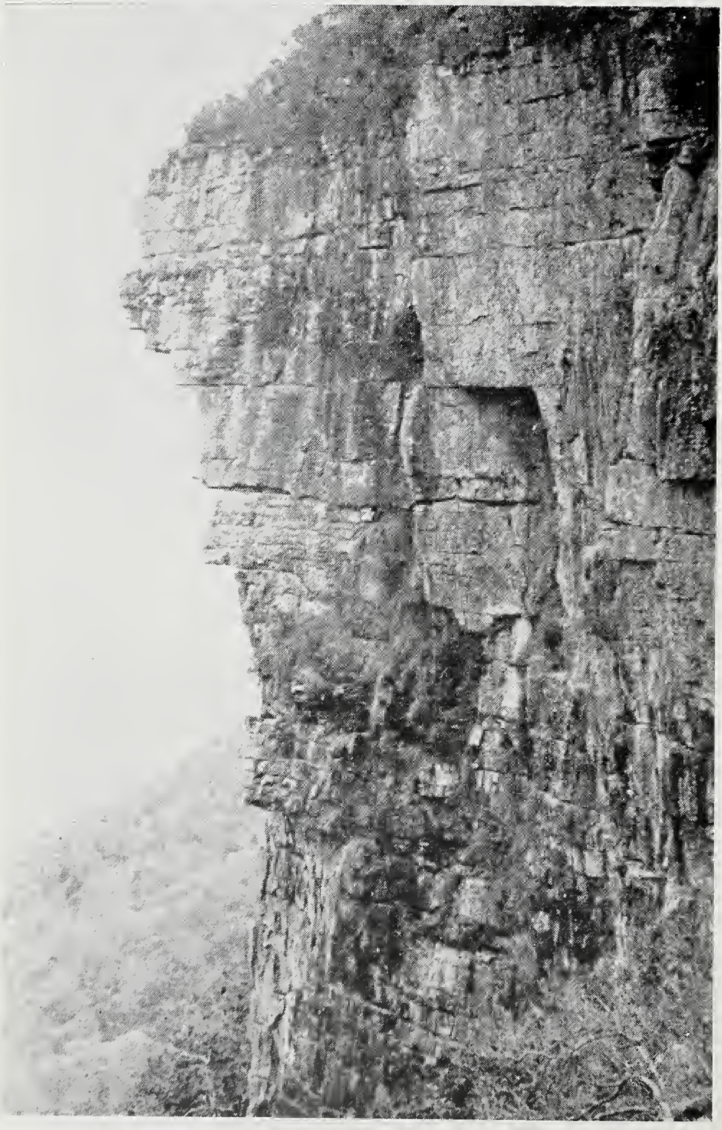


PLATE 7.—*Danthonia macowanii* on moist cliff face. This grass forms dense consocies covering a large area of the cliff face. *Passerina filiformis* Scrub may be seen near the top of the cliff. Note the numerous joints in the Table Mountain Sandstone.

Photo: D. N. Watton.

Plate 8.—*Ficus craterostoma.* This tree is situated on a ledge near the base of the cliff. Its roots may be seen reaching down to the forest floor below.

Photo: A. W. Bayer.

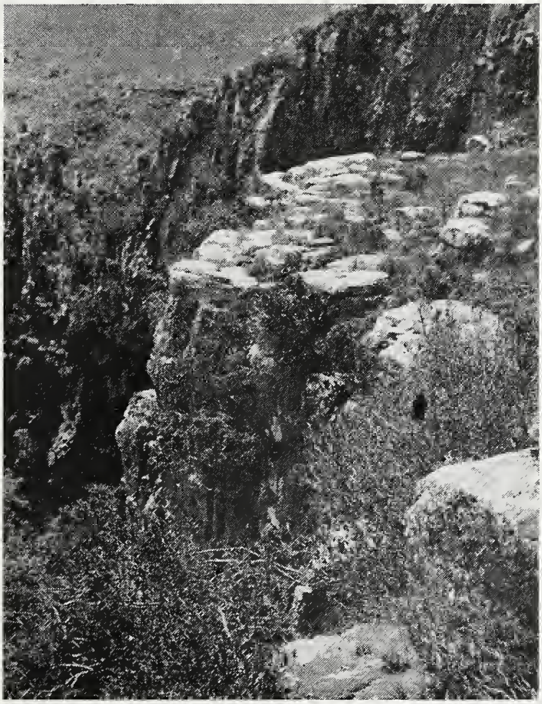


Plate 9.—*Pterocelastrus—Schrebera* Scrub. The upper limits of this community can be seen near the top of the cliff. *Photo: D. N.* Watton.

PLATE 10.—*Aristida junciformis* Grassveld on the summit of Table Mountain. Note the numerous footpaths, some of which are well on the way to becoming dongas. *Photo: D. N. Watton.*

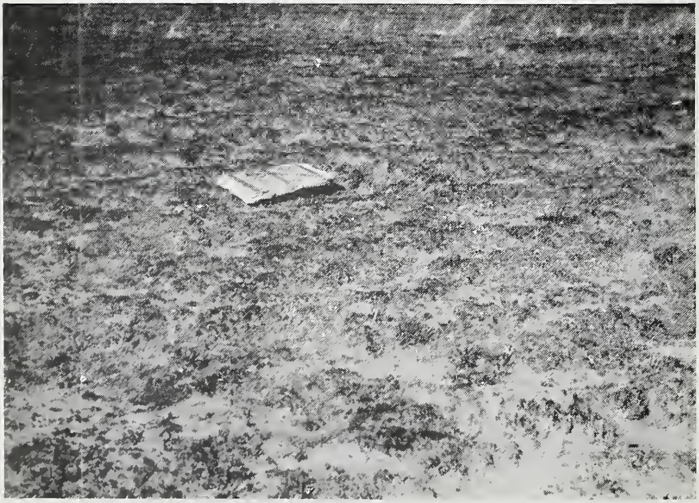


PLATE 11.—*Aristida junciformis* Grassveld after burning. Note the open and tussocky nature of the community. *Photo: D. N. Watton.*

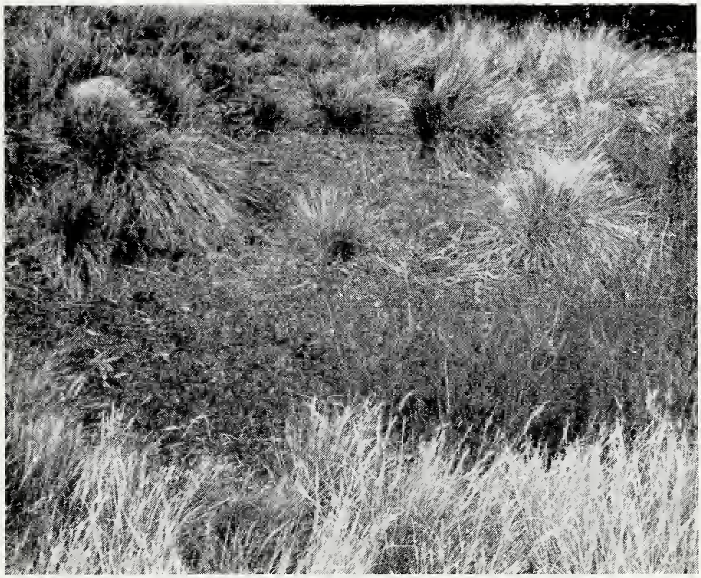


Plate 12.—Incipient sinkhole. The low-growing grasses covering the floor of the hole are *Chloris pycnothrix* and *Sporobolus capensis*, On the right is *Nesaea salicifolia* and surrounding the hole is *Aristida junciformis*. In the background is a mature sinkhole. *Photo: D. N. Watton.*

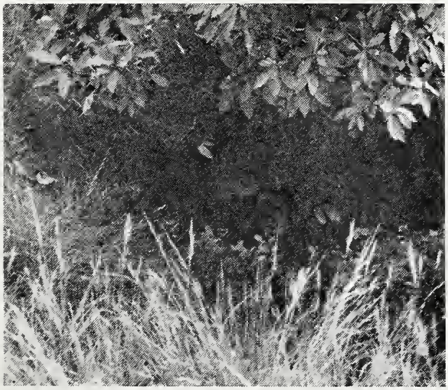


Plate 13.—Intermediate sinkhole, type 4. Overhanging the hole is *Maesa lanceolata*, between whose branches may be seen a dead trunk of *Cyathea dregei*. On the walls of the hole are *Begonia natalensis*, *Lobelia pteropoda* (with white flowers at right), *Rhynchelytrum* sp. (40) and *Panicum natalense* (in flower). The foreground is occupied by *Aristida junciformis*. *Photo: D. N. Watton.*

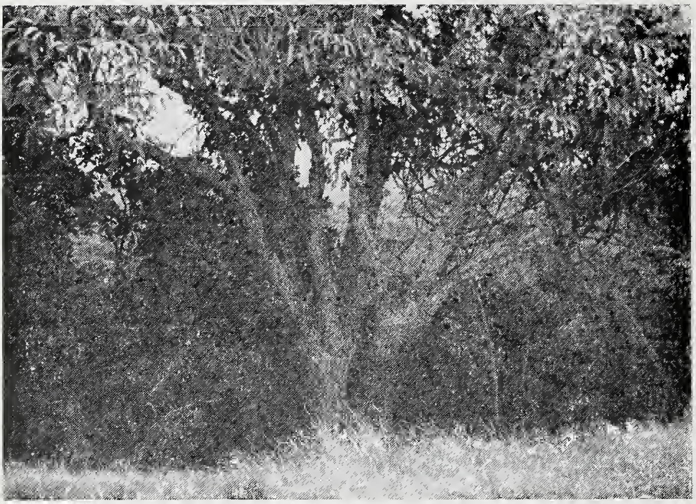


Plate 14.—Mature sinkhole. On the left is *Xymalos monospora* with a dense crown and on the right is *Cussonia spicata* festooned with *Rhoicissus cuneifolia* and *Dalbergia obovata*. *Aristida junciformis* is in the foreground. Note the shallow and wide structure of the hole. *Photo*: *D. N. Watton.*

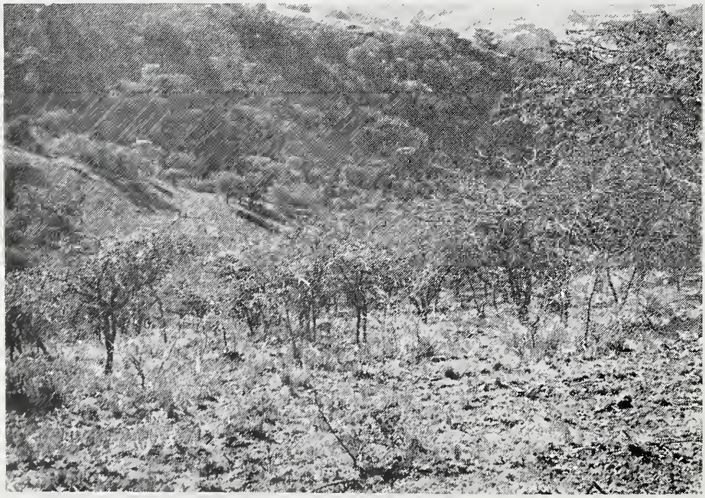


Plate 15.—Thornveld in the Umgeni Valley. *Acacia nilotica* is the dominant tre
The grass cover consists of *Aristida junciformis* and *Sporobolus capensis*.
Photo: *D. N. Watton.*

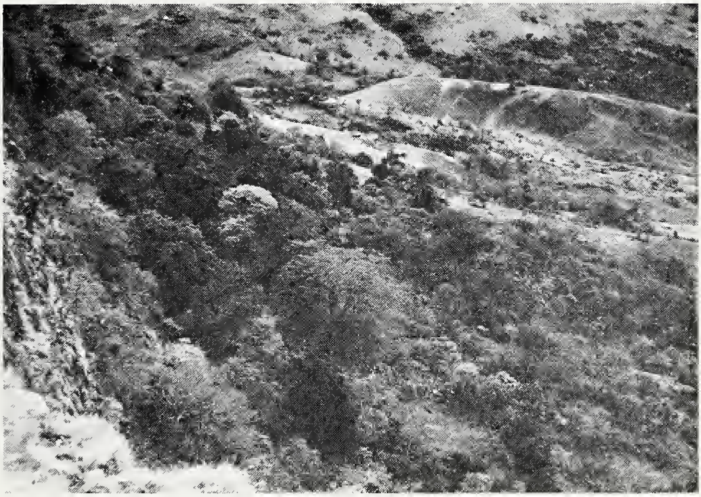


Plate 16.—A view of *Combretum holosericeum* Woodland. *Combretum holosericeum* may be recognized by its light crown and *Trichilia roka* by its dark crown. The large tree in the centre of the photograph is *Ficus natalensis*. *Photo*: *D. N. Watton*.

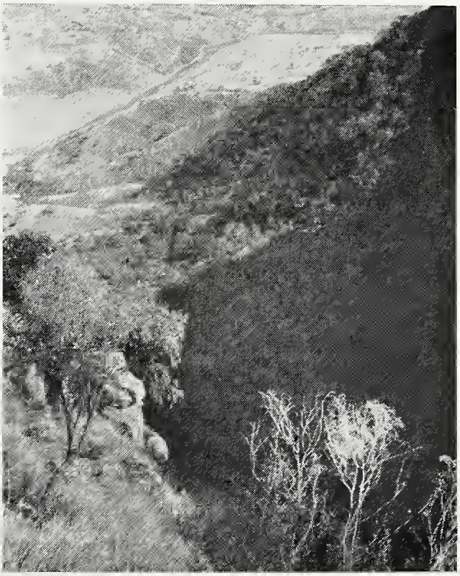


Plate 17.—View of the Amatulu Forest. This photograph, taken from the top of the mountain, shows part of the forest lying in the shade cast by the adjacent cliff. In the foreground is *Passerina filiformis* Scrub. The descent into the forest is made at this spot. *Photo*: *D. N. Watton*.

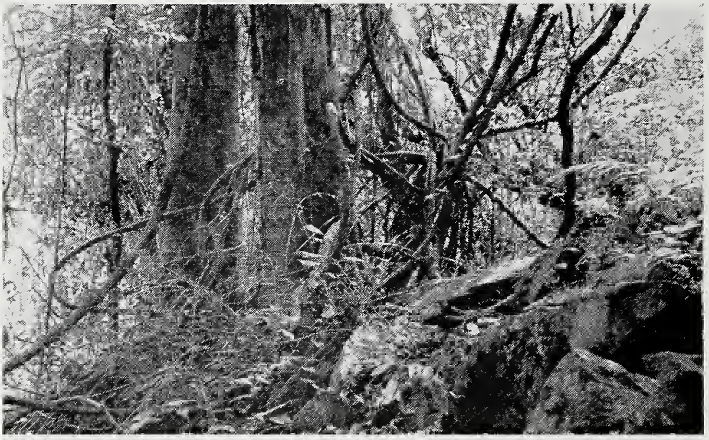


PLATE 18.—Interior of Kloof Forest. Two specimens of *Trichilia roka* supporting *Rhoicissus capensis*. *Photo*: *D. N. Watton.*

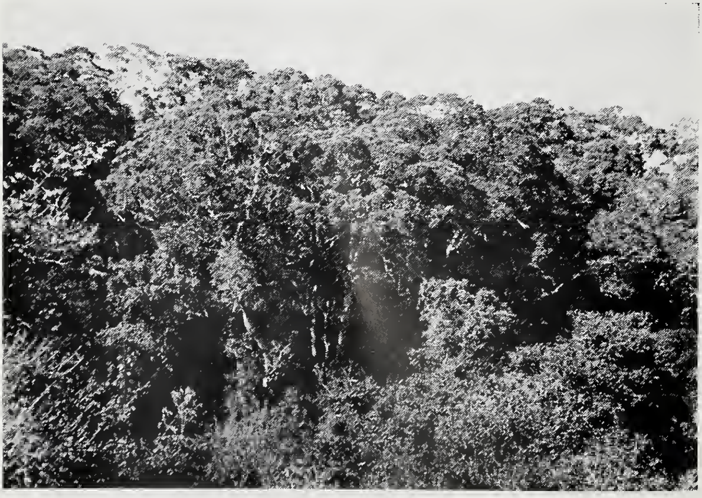


PLATE 19.—*Syzygium gerrardii* Consociation. This community, a part of Kloof Forest, is situated along the top edge of a cleft in the mountain. *Photo*: *D. J. B. Killick.*

Plate 20.—*Todea barbara* Society. This community is situated on the right and *Pteridium aquilinum* and *Danthonia macowanii* (in flower) are on the left. *Photo: A. W. Bayer.*

Plate 21.—Mixed field layer society. Herbs present are *Plectranthus ciliatus, Galopina circaeoides, Begonia natalensis, Impatiens duthieae, Aneilema aequinoctiale, Cyperus albostriatus* and *Blechnum attenuatum. Photo: D. N. Watton.*,

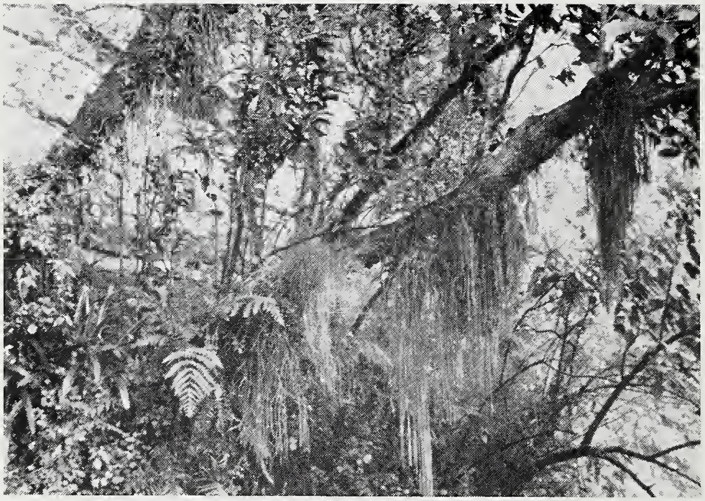


Plate 22.—Epiphytes in Kloof Forest. Hanging from the spreading branches of *Xymalos monospora* are *Lycopodium gnidioides* and *L. verticillatum.* Other plants not normally epiphytic are also present on the branches viz. *Lonchitis stenochlamys* and the grass *Ehrharta erecta. Photo: D. N. Watton.*

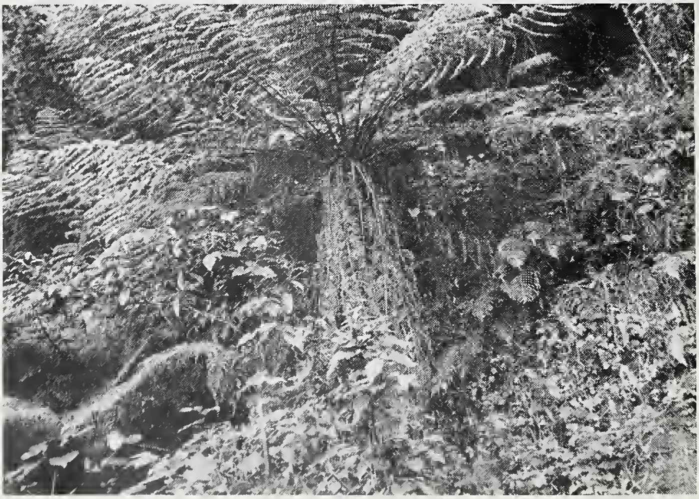


Plate 23.—*Cyathea capensis.* A clump of this treefern situated in a moist part of the Amatulu Forest. *Photo: D. N. Watton.*

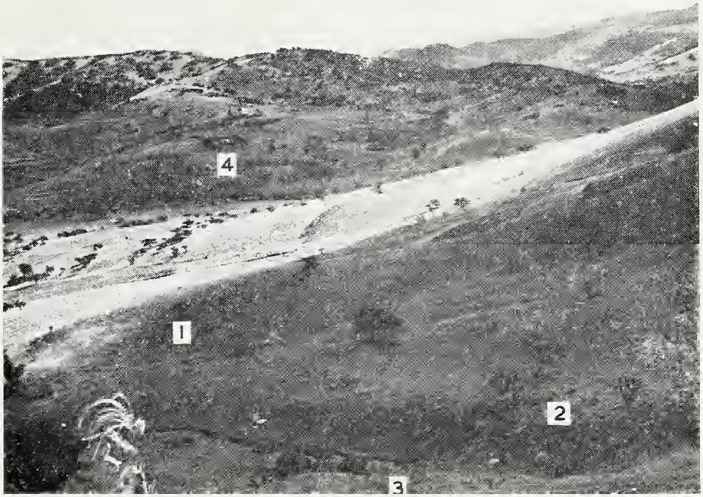


PLATE 24.—Portion of the Umsindusi River Valley. This area was probably once clothed with Thornveld. Two obvious relics of Thornveld are present viz. isolated specimens of *Euphorbia ingens* (1) left because of poor fuel value and patches of *Randia rudis* (2). The grasses *Aristida junciformis*, *Sporobolus capensis* and *Imperata cylindrica* provide the grass cover. In the foreground are numerous saplings of *Acacia nilotica* (3). *Euphorbia tirucalli* (4) may be seen surrounding several kraals on the other side of the river. *Photo: D. N. Watton.*

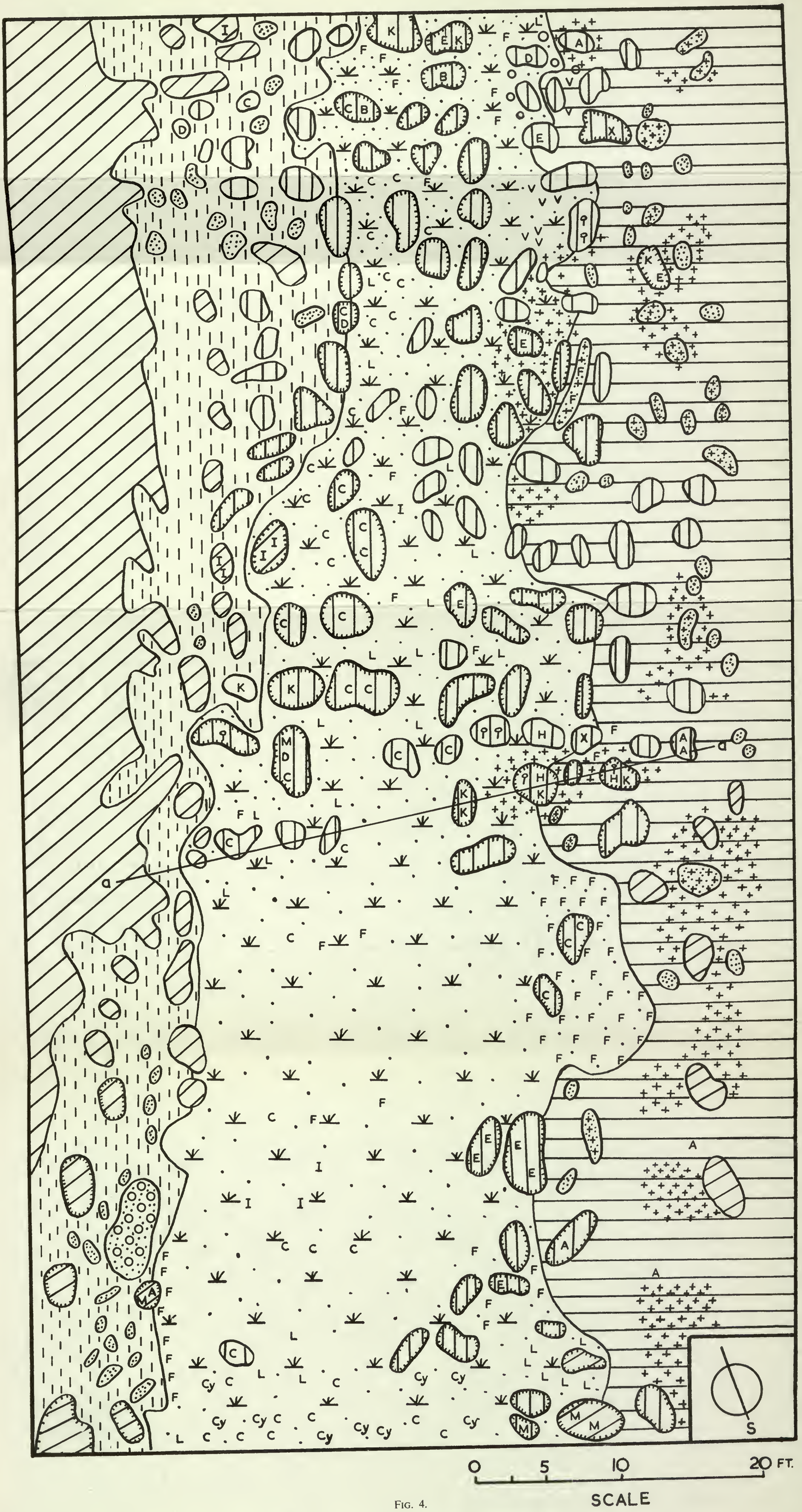
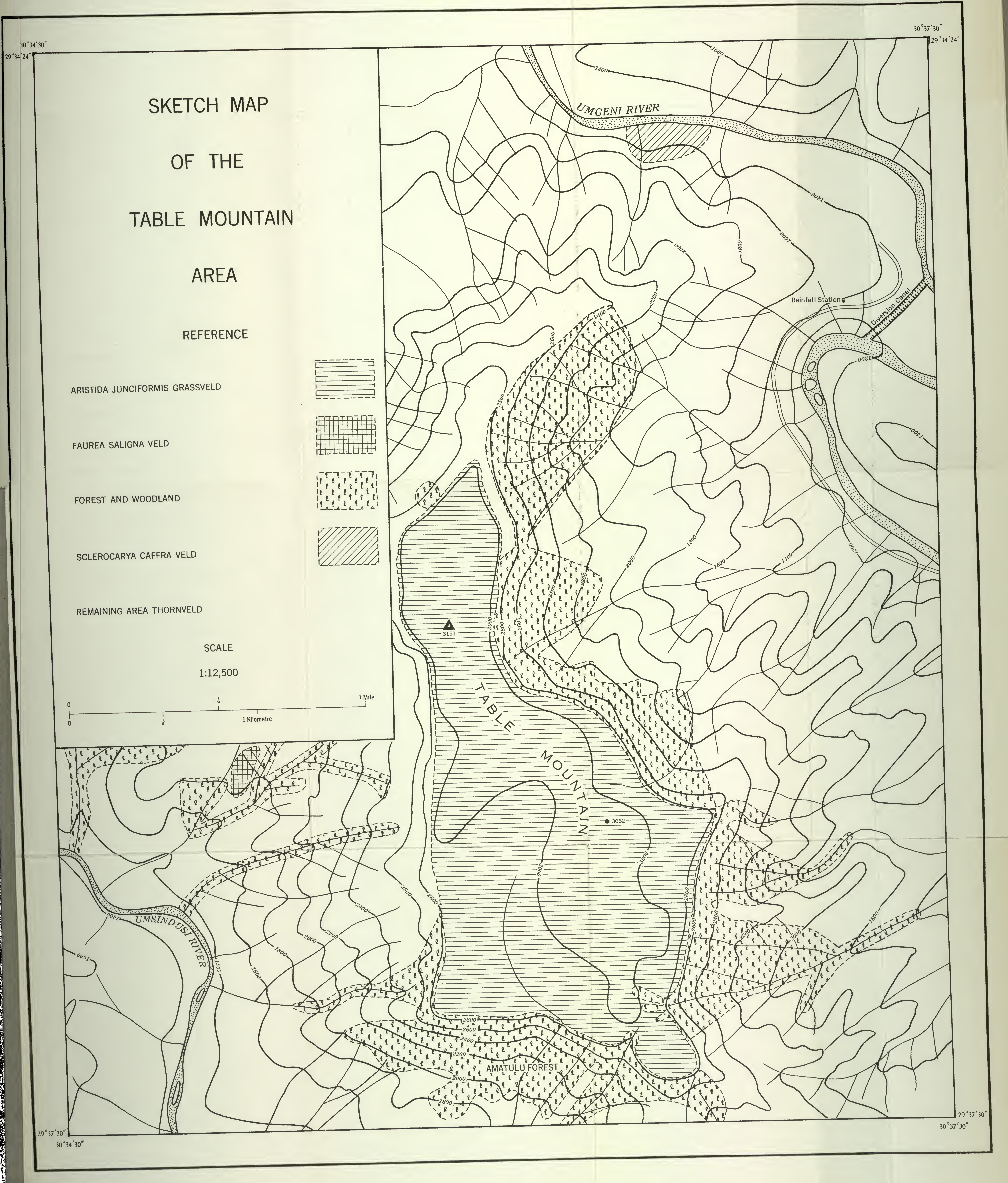


FIG. 4.

Map of portion of Vlei showing distribution of communities.

SKETCH MAP OF THE TABLE MOUNTAIN AREA



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